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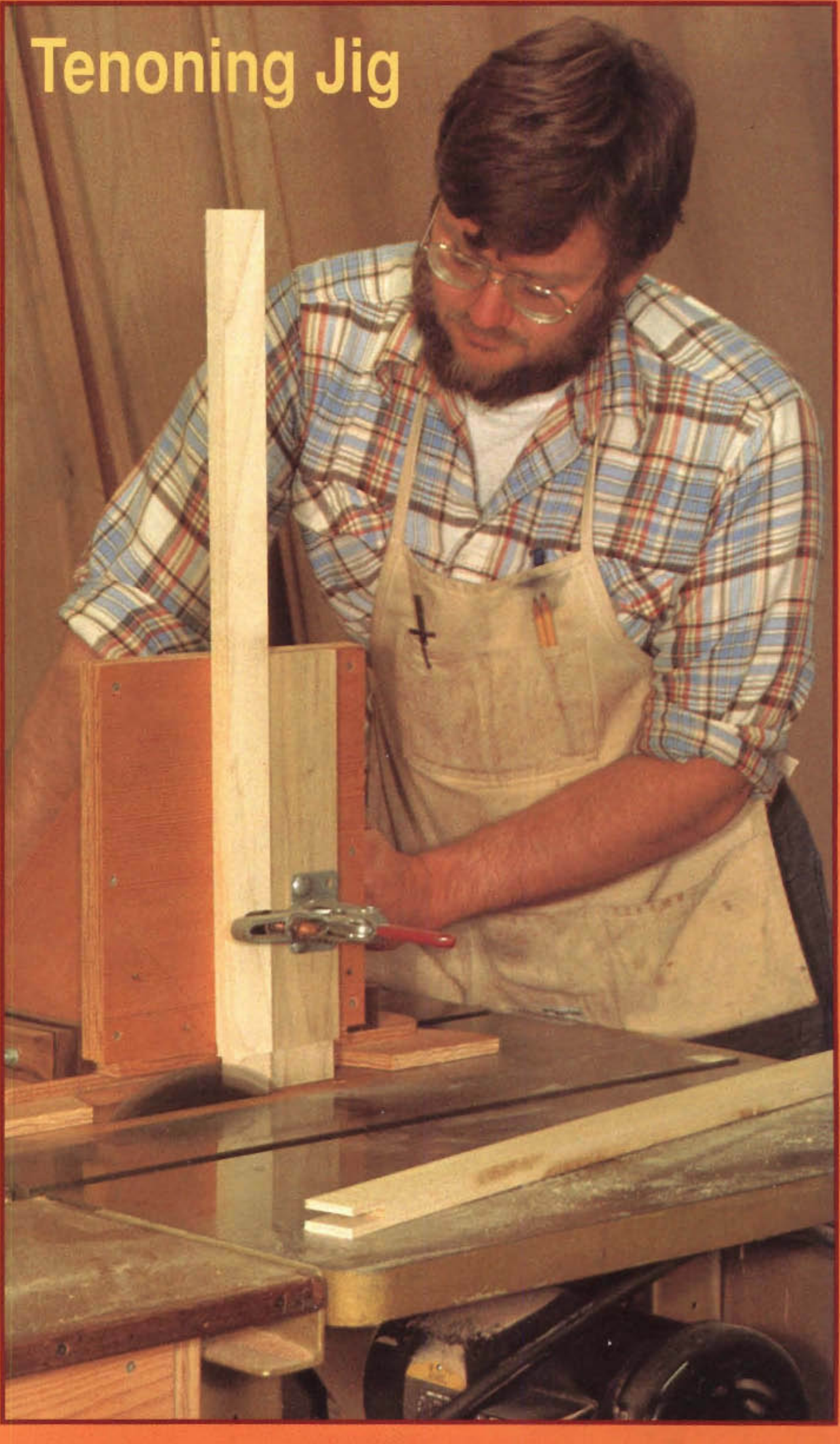

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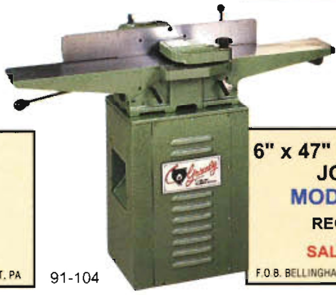

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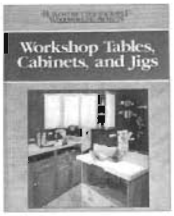

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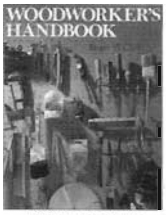

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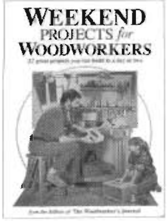

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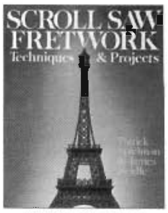

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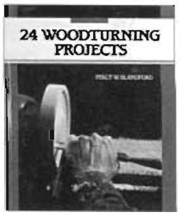

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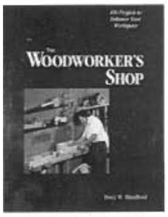

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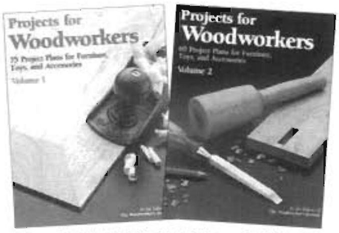

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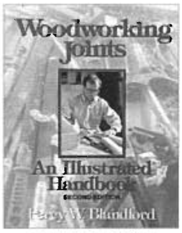

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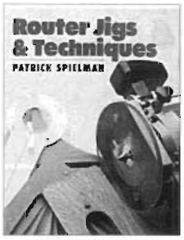

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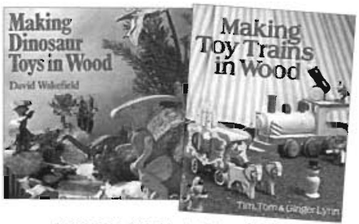

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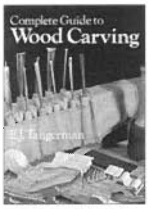

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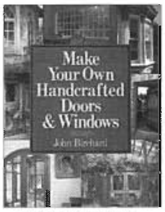

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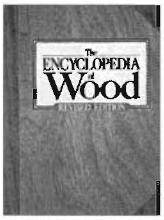

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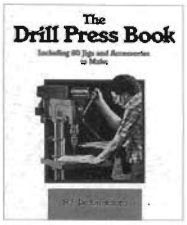

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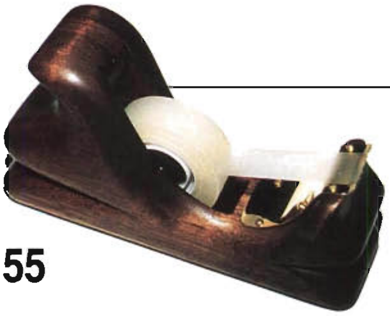

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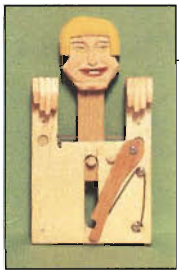

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On the Cover

Jeff Greef demonstrates the use of his "Advanced Tenoning Jig." This fun and challenging *Project for the Shop* is a real "precision instrument." Instructions for building one of your own begin on page 26. Once it's built, you can put it right to work making **Ken Sadler's** "Contemporary Coffee Table" project on page 64.

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Clear Cuts

We had a lot of fun with this one, and I think it shows. You'll find a lot of neat ideas and interesting projects on the pages that follow. They range from ridiculous to sublime and from functional to furniture. From decorative to out–and–out workhorse tough.

We ran a cartoon a couple of issues back that was kind of a satire on the traditional sawhorse; different designs were named after other farm animals... Well, Don Kinnaman came up with a version that we call "The Workhorse." It's got a wider work surface than your typical sawhorse and it's strong and quick to make. Other *Projects for the Shop* in this issue include a "Saw Blade Carrier" for storing and transporting saw blades to the sharpening shop, and "An Advanced Tenoning Jig." This jig is a fairly complex mechanism that's fully adjustable and spring retractable (in other words, fun to make), and it'll come in handy for cutting the tenons on the "Contemporary Coffee Table."

Our "Pocket People" project involves another fun mechanism—a simpler one to make. It operates through the use of a safety pin and a rubber band. These little carved fingers hang from the rim of your shirt pocket, and with the push of a lever, her head pops up! It's a little silly, but it's a good excuse to practice your caricature carving.

You can fire up your scroll saw and try your hand at some intarsia, or you can use it to make our decorative "Deacon's Bench." Phil had a lot of fun with this one; he got a little carried away and came up with four different versions. I've got to slow him down next time, because he filled up our PullOut™ Plans too quickly, so we had to give you an extra sheet of them this time. You don't mind, do you?

Some space was taken up by the full–size patterns for our "Executive Tape Dispensers"—more than one version again. Actually these two are a matched set: one for clear tape and one for masking tape. You'll like the way they look made out of fine hardwood.

There's a new guy around here called Ron Stotts who got a real initiation when he edited his first project. "The Three–Drawer Nightstand" was a reader–designed project that I had him build so he could see how to present it clearly. When he finished, he wasn't quite satisfied with the way the case was constructed, so he redesigned it—keeping the same look. Now we know that the nightstand you build won't be a problem for you, and I know that Ron is going to fit right in and do a good job with any project I give him.

But enough about the fun we had in making this issue for you; it's time you turned the page and started having fun for yourself.

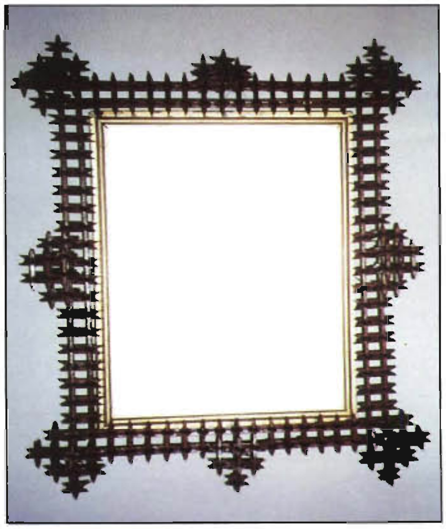
David M. Camp

Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.

Old Time Sailor's Work

I read with interest the article on Sailor's Work by Helmer C. Hanson in the March issue (#59). I'm sending you a photo of a picture frame my grandfather made over 125 years ago. He was blinded during the Civil War, but he carved the pieces by hand from oak.



I'm also a woodworker and enjoy the magazine.

V. D. Vandlen
Battle Creek, MI

In Defense of Skil

My father–in–law, a fellow woodworker, just gave me eight or ten back issues of your fine publication. I've read them all and I am left craving for more. Most woodworking magazines bore me to death. I have gotten more good project ideas from *PW* than all other sources in the last ten years. Thanks.

I do have a slight disagreement with your March issue *Tool Talk* article ("The Latest in 12–Volt Cordless Drill Technology"). I've been slow to go to battery–powered tools. I couldn't believe they have the power to do real work—until I tried them out. The first one, the Milwaukee, was hard to handle. Next, the Makita, Sears, and so on—all fell by the wayside. The Skil Professional was best. Your article said it listed for $231, but I found it consistently under $150.

I haven't found anyone who could stop it on low speed. At last count mine has driven over fifteen thousand screws, although it's been used very little for drilling. It's been dropped often on the shop's concrete floor, too, but has no problems. Sanford Wilk may have tested a defective one. Mine has been used hard for two years now.

William B. St. Onge
Bedford, NH

Another Gunslinger

Thanks for the excellent article "Jointer/Planer Showdown" in the May issue (#60), but you missed one: the INCA Models 550/570.

I've used the 570, a 10¼" jointer and planer for the last two years and must say that it's an outstanding piece of machinery. The Tersa three–knife head makes blade–changing a breeze. I can change all three blades in less than a minute with no alignment to worry about. The jointing width is also a big plus.

Here are the specs for both the jointer and planer:

10¼" maximum stock width
3 knives
⅛" depth of cut
⅛" minimum stock thickness
6000 rpm cutterhead speed
11 or 16 fpm feed speed
2hp (115V 05 220V) motor

Donald R. Chapman
Woodland Hills, CA

Trees To Go

While looking through my woodworking magazines, my eye caught a letter to the editor entitled "Foresters and Forestry" in the May 1990 issue (#54). Now I understand why public opinion is against foresters, when we have old men who know nothing about modern forestry, like Mr. Nils Lucander, making comments.

Let me set the record straight. I am a graduate forester from Pennsylvania State University and have worked for private industry for over thirty years and have managed Company woodlands for this time. If it took us half an hour to plant a loblolly pine, Mr. Lucander would be using corn cobs instead of toilet paper.

There are contract planting crews which start in the South in November and work their way north by the end of the planting season in mid–May. Each planter will plant between 3,000 and 4,000 loblolly pines per day. Therefore, with a crew of ten planting 30,000 trees per day, it takes only 13.3 days to plant the 400,000 trees as the Weyerhaeuser Company advertised. Mr. Lucander is slightly behind the times and we do things differently in America.

T. N. Reeder
Locust Grove, VA

Routing Arcs

Less than an hour after the May issue (#60) arrived, I was in my shop making the "Big Compass." I had a couple of strips of walnut with which I made the arms, and I used some 3/16" hardwood stock for the adjustment arc so I wouldn't need to use the spacer; I felt it would be more aesthetically appealing without it.

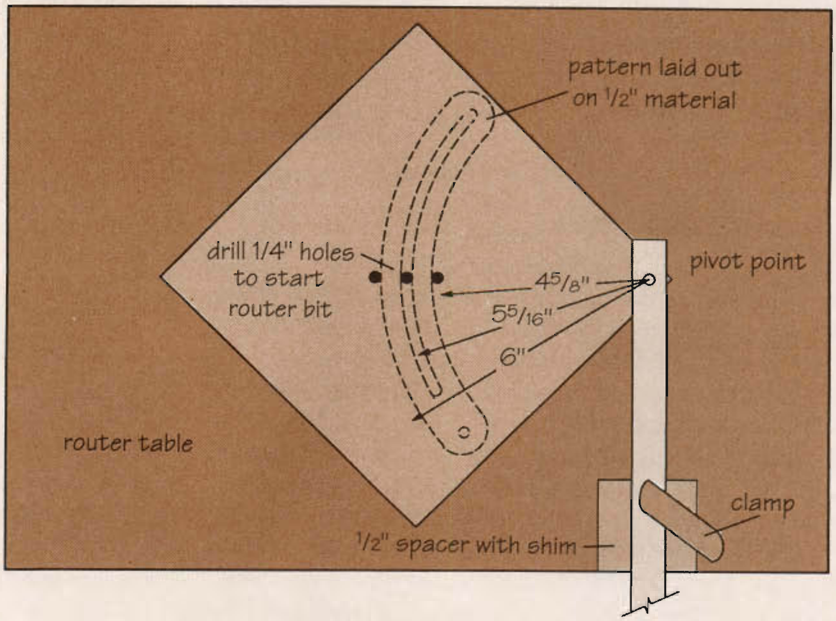
Cutting the arms was straightforward, but after cutting three arcs, I still wasn't satisfied with the looks (though they were functional). I was unable to follow the lines close enough with either a jig saw or a scroll saw.

Trying to use my router to follow the lines was the impetus for the jig I came up with. It's very simple, and I can see many future uses for it. What I did was to use a 1/4" router bit in my router table to cut out the arc and the slot down the center.

I cut out an oversized piece of material and marked a pivot point in one corner. From this point, I measured the three radii indicated below to locate the centers for 1/4" holes. I drilled the holes and then fit the piece over the router bit. I drove a brad through a strip of wood and into the pivot point; then I clamped the strip of wood to the router table with a spacer underneath that was slightly thicker than the stock. With this setup, I was able to rout the slot perfectly; then I shifted holes and reclamped the strip holding the pivot point so I could cut the inside and outside edges of the piece the same way. I had my compass cut out, assembled, stained and dried before dinnertime.

Jim Johnson
Brunswick, Ohio

Arc Routing Setup


pattern laid out on 1/2" material
drill 1/4" holes to start router bit
pivot point
4 5/8"
5 5/16"
6"
router table
clamp
1/2" spacer with shim

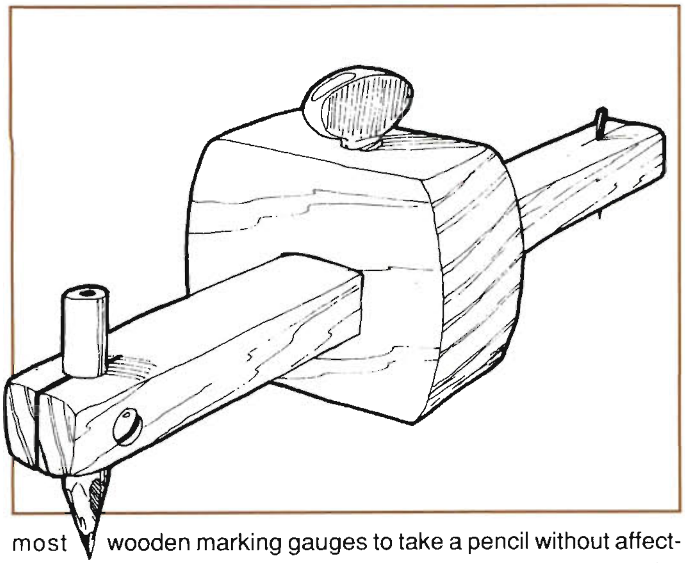
Peter Stumpp

Tricks of the Trade

Tricks of the Trade shares readers' tips for making woodworking tasks easier and safer. Send yours to Tricks of the Trade, c/o Popular Woodworking, 1320 Galaxy Way, Concord, CA 94520. We pay $25 for each trick we publish.

Pencil Gauge

The common marking gauge is a useful tool for scratching a line parallel to an edge. But there are occasions when you don't want a scratched groove because it might spoil the appearance of a finished surface—a pencil line would be better. You can adapt most wooden marking gauges to take a pencil without affecting its use with the steel point. About ¾" from the end opposite the steel point, drill a hole in the stem to hold a short piece of pencil. Make a saw cut from the end through the hole and about ¼" beyond it. Drill and countersink through the cut between the pencil hole and the stem end for a #4 round head screw to squeeze and grip the pencil.



Percy W. Blandford
Stratford–upon–Avon, England

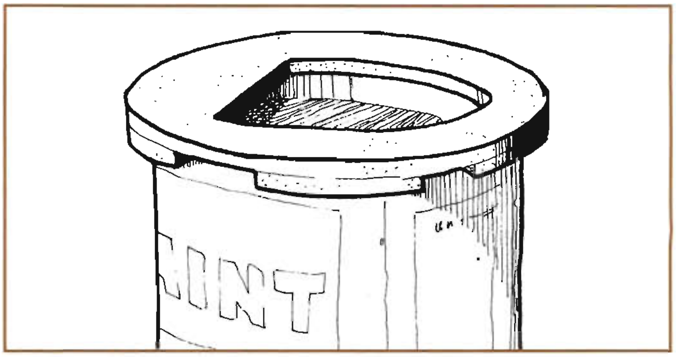
My Ultimate Push Stick

After many years of using different types of table saw push sticks, I've settled on one particular design as the safest and most comfortable. You'll find a full–size pattern for it in the PullOut™ Plans. This design puts pressure at the notch and the forward end to hold the stock down while pushing it past the blade. This is especially helpful on thin stock. The shape of the push stick allows me to guide it along the rip fence and rest my hand on the fence, applying pressure as necessary. Thus, if something unexpected were to happen, my hand would not fall or be carried into the blade. I make them out of ¼", ⅜" and ½" plywood scraps. The ¼" works very well when ripping extremely narrow stock.

Robert Colpetzer
Clinton, Tennessee

Finish Can Rim Guard

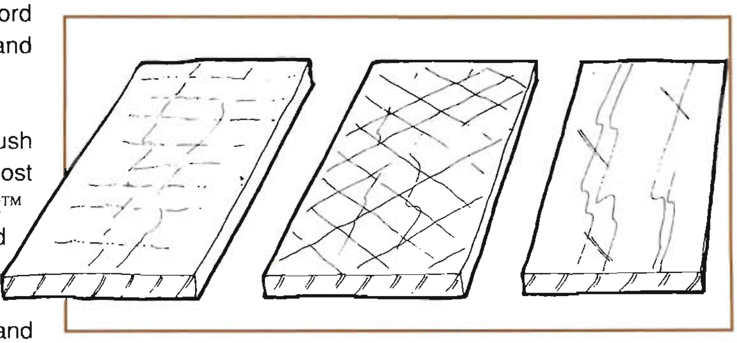
This simple can guard makes cleaning up the rim and side of my varnish and paint cans unnecessary. It also solves the problem of can lids that fail to seal because of hardened residue left in the rim. To make two rim guards (one for varnish and one for paint), cut three 5" diameter disks from ⅛" tempered hardboard. On one of the disks, lay out a 4¼" diameter circle. Cut it out and discard it, keeping the outside ring. From this ring cut eight segments. On the second and third disks, lay out a 3" diameter circle and draw a chord (a line from one side of the circle to the other) about 1" from the centerpoint. After cutting out the semicircle and chord on each disk, center each disk on a quart can. Glue the eight ring segments to the bottom of the each disk (four on each). Space them equally around the disk and snugly against the can. You now have guards that enable you to strike your brush while keeping the rim and outside free of finish. To make guards for gallon containers, simply increase the dimensions.



Robert Colpetzer
Clinton, Tennessee

Eliminating Sanding Dips

I build many projects using wide panels of glued–up cedar 1 X 6's, and used to have difficulty detecting and eliminating dips left by my belt sander. Here's one solution: after initial cross–grain coarse sanding, draw heavy diagonal lines across the surface with a large, soft–lead pencil. Then sand evenly until all the lines are gone. Repeat the procedure, but draw lighter lines as the paper grit gets finer.

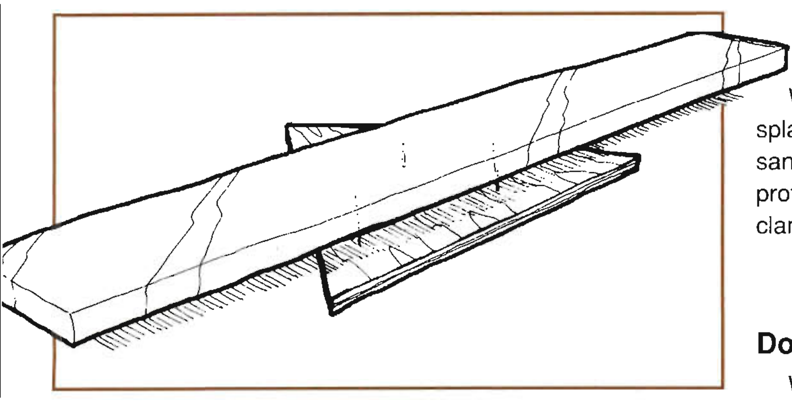


C. A. Conway
Benton City, Washington

Tricks of the Trade

Painting Stilts

Many small projects require finishing on opposite sides, as well as along edges. You have to finish one side, let it dry, then finish the other. Speed up the work with painting stilts. After finishing one side of the project, set it on the stilts and finish the remaining surfaces. Leave it on the stilts if you want to add more coats. When dry, lift the project off and there will be just three small prick marks on the back. Make the stilts by cutting a small triangle, square or circle of $^3/_8$" plywood and driving three or four 6d finishing nails all the way through. It helps to sharpen the nails first on a belt sander or grinder—the sharper the point, the smaller the mark it will leave on the back of the project.



David F. Black
Barnwell, South Carolina

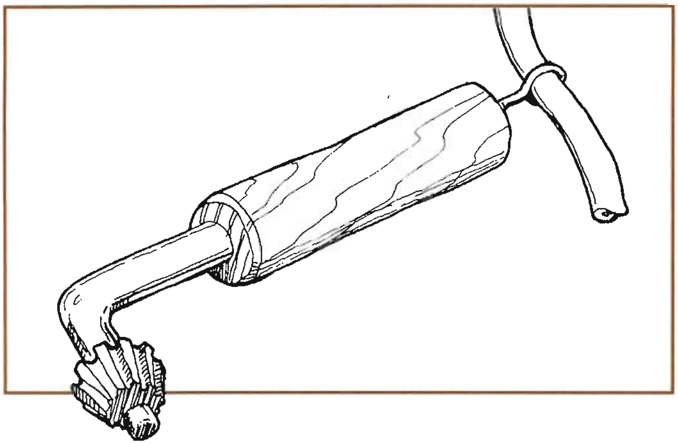
Save That Old Antenna

Before junking that old radio or television, remove and save the antenna. Those with a telescoping design will provide several diameters, and they're easily cut to different lengths with a tubing cutter for use in shop projects. I've used them as bushings or sleeves in whirligigs and children's toys.

John Tomlin
Niles, Ohio

Chuck Key With Leverage

The best handle for a chuck key not only keeps it handy, but provides you with some leverage. Cut off the rounded tip from a discarded broom handle so you have a piece 4" to 6" long. Drill a hole in the flat end slightly smaller than the drill chuck key, and force fit it into the wooden handle with some epoxy for extra grip. Then fit the tip of the rounded end with a screw eye large enough to surround the drill's cord. Open the eye with pliers, slip it around the cord and close it up again. The extra length of your new handle will make loosening tightly chucked bits a breeze.



Don Kinnaman
Phoenix, Arizona

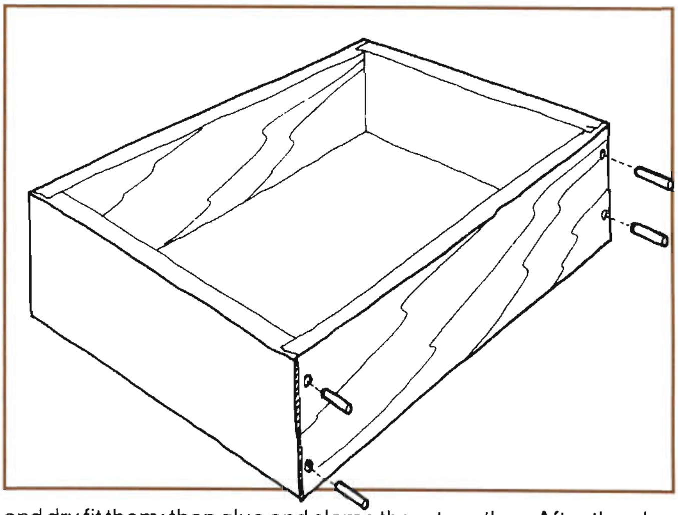
Clamping On An Angle

When clamping on an angle, such as when re–gluing a splayed chair leg, the clamp has a tendency to slip. A piece of old sandpaper doubled over (rough sides out) and placed under the protecting block will usually provide enough friction to keep the clamp in place.

William P. Nichols
Ravenna, Ohio

Doweling Plywood Drawers

When you make drawers out of plywood, screws or nails may not hold very well if they end up positioned in the seam between two plys. Try using dowels instead. First cut all the drawer pieces and dry fit them; then glue and clamp them together. After the glue has dried, unclamp the drawer and drill holes in the side pieces where they meet the front and back. Apply glue to lengths of dowel and insert them in the holes.



Dan Labzentis
Endicott, NY

Shelf With An Edge

If you're having trouble with screwdrivers and other rounded objects rolling off the metal shelf units in your shop, try turning the shelves upside–down. Just take the units apart and put them back together. When the shelves are upside down the 1" edge stands up and provides a barrier—no more looking for things that have fallen behind the shelves.

Beverly L. Puterbaugh
Piqua, Ohio

Book Reviews

by Hugh Foster

The Good House: Contrast as a Design Tool by Max Jacobson, Murray Siverstein, Barbara Winslow, ©1990 (The Taunton Press, 63 South Main St., Box 5506) 147 pages, hard cover, $21.95

Ordinarily, I prefer to deal strictly with woodworking books in these reviews, but here is an architecture book that may well change the way you plan your furniture designs. The authors propose that there are six kinds of contrast required in every good design. As I read about the contrasts of inside/outside, exposed/tempered, up/down, something/nothing, light/black, and order/ mystery, I realized that while these elements are indeed important to houses, they apply as well to pieces of furniture. Indeed, the authors fairly regularly use pieces of furniture to illustrate smaller nuances of their point.

The principles of design have been with us since antiquity, yet Jacobson and his co–authors give us another way of looking at them. This book may change the way you plan your projects; it may even encourage you to plan your own.

American Country Furniture: Projects from the Workshops of David T. Smith by Nick Engler and Mary Jane Favorite, ©1990 (Rodale Press, Book Reader Service, 33 East Minor St., Emmaus, PA 18098) 422 pages, hard cover, $29.95

The nearly three dozen craftspeople at the workshops of David T. Smith make reproductions of household items that were used by the pioneers. Each piece is made by a single craftsperson from start to finish. Engler and Favorite open with a bit of history of workshops and country furniture-making, but soon move into fifty easily followed step–by–step plans and specific ways to modify them. By beginning with the easier projects, a beginning woodworker can quickly progress to the more difficult ones. Techniques presented include hand–cut dovetails, bentwood boxes, routing dovetail mortises and tenons, attaching moldings, weaving a rush seat, making tin panels, and installing glass in cabinet doors. There's a special section on finishing.

I've shown the book to several woodworker friends, and, without exception, they want a copy. It contains projects people will want to build and use. It's a beautiful volume, clear and well designed.

Country Classics: 25 Early American Projects by Gloria Saberin ©1991 (Tab Books, Blue Ridge Summit, PA 17294) 166 pages, paperback, $12.95

The author has more than fifty years of woodworking experience and has adapted some classic country patterns in a most handsome fashion. Her project descriptions are clear and easy to follow. In an inviting writing style she presents small household accessories, furniture, toys and doll furniture for a total of 25 new projects.

The Craft of Chair Seat Weaving (with Cane, Rush, Splint and Rope) by George Sterns ©1990 (Interweave Press, 201 East Fourth Street, Loveland, CO 80537 (303-669-7672)) 159 pages, paperback, $18.95

Around ten years ago someone offered me an old walnut chair with a broken–out cane seat. The best price they could find on the repair was sixty cents per hole, and at four holes per inch it didn't take much to figure out it would cost a lot of money. I declined the offer, and thus lost what might have been a valuable antique. As it happens, my Danish rope chairs are almost due to be re–wrapped; I had worried a bit about sending them out, but with Stern's step–by–step instructions, I'm confident I'll be able to do the reweaving on these or most any chair. He's provided enough photos and drawings so you might be able to follow his directions without even reading the text. In addition to the clear instructions, he gives us many decorative variations that might make cane weaving a handsome addition in some of our upcoming projects.

Making Wood Folk Instruments by Dennis Waring ©1990 (Sterling Publishing Co., Inc., 387 Park Avenue South, New York, NY 10016) 160 pages, paperback. $12.95

This was published in Canada in 1979 as **Folk Instruments**, so if you're a long-time maker of folk instruments, you may already have a copy. The book contains plans for simple string, wind, percussion, and more complex stringed instruments. It takes two full pages just to list the projects and possibilities: there are over forty plans here which range from simple and silly to genuine and serious. Music lovers may want to experiment with several. Only the complex stringed instrument section really requires much woodworking at all; plans there include zithers, harps, fiddles, and as handsome a mountain dulcimer as I've seen. If you love both craftwork and music, you shouldn't be without this handsome book.

Folk Art Woodcarving: 823 Detailed Patterns by Alan and Gill Bridgewater ©1990 (Sterling Publishing Co., Inc., 387 Park Avenue South, New York, NY 10016) 192 pages, paperback, $12.95

Seriously, how could one resist a book that offered 823 detailed patterns for $12.95? At about a cent and a half per pattern, you might be dubious of the quality. Don't be. Whether you're carving 3–D or relief, there are plans here for you. Next time you want to carve a border onto a frame or furniture project, look no further than this endlessly fascinating picture book. Brief commentaries detail the origins of each pattern. While the instructions are few, the inspiration is plentiful. I enjoy this book, and feel you carvers will too; it's sure to be a valuable reference source.

The Drill Press Book: Including 80 Jigs and Accessories to Make by R.J. De Cristoforo ©1991 (Tab Books, Blue Ridge Summit, PA 17294–0850) 290 pages, paperback, $16.95

I know what you're thinking: "What's to know about a drill press?" If, like me, you thought you knew it all, think again. De Cristoforo takes us on a tour of the drill press, its commercial accessories, and a collection of shopmade jigs and accessories. As usual, he's an excellent guide; the book is illustrated with drawings and photos which clearly show what words may fail to describe. Indeed, if there is a problem with the book it may be that it's *too* useful. I found so many neat jigs and fixtures to make in this collection that I'm sure to spend time making them rather than the projects. You're sure to find ideas here about how to get still better value from your drill press. PW

Hugh Foster *is a part–time furnituremaker in Manitowoc, Wisconsin, and author of* The Biscuit Joiner Handbook *(Sterling Publishing, 387 Park Ave. South, New York, NY 10016).*

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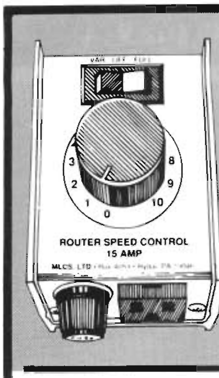

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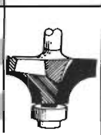
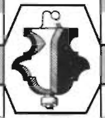
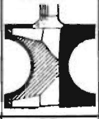
#602		3/16" Spiral Cutter		3/16"	⅝"	¼"*	$12.00
#603	**Solid Carbide**	¼" Spiral Cutter		¼"	¾"	¼"	$12.00
#903		¼" Spiral Cutter		¼"	¾"	½"*	$12.00
#904		⅜" Spiral Cutter		⅜"	1"	½"*	$24.00
#905		½" Spiral Cutter	*Proper Adaptor Will Be Supplied	½"	1½"	½"	$29.00
#350		⅛" **Round Over**	⅛" R	¾"	⅜"	¼"	$11.00
#351		3/16" Round Over	3/16" R	⅞"	½"	¼"	$11.00
#230		¼" Round Over	¼" R	1"	½"	¼"	$12.00
#353		5/16" Round Over	5/16" R	1⅛"	½"	¼"	$14.00
#209		⅜" Round Over	⅜" R	1¼"	⅝"	¼"	$15.00
#355		½" Round Over	½" R	1½"	¾"	¼"	$17.00
#656		¾" Round Over	¾" R	2"	⅞"	½"	$21.00
#199		**Multiform Moulding**	Unlimited Patterns	2¼"	2"	½"	$40.00
#340		⅛" **Cove**	⅛" R	⅝"	⅜"	¼"	$12.00
#205		¼" Cove	¼" R	1"	½"	¼"	$12.00
#206		⅜" Cove	⅜" R	1¼"	9/16"	¼"	$13.00
#207		½" Cove	½" R	1½"	⅝"	¼"	$14.00
#208		¾" Cove	¾" R	1⅞"	¾"	½"	$26.00
#460		¼" **Bull Nose**	¼" Dia. of Circle		⅜"	¼"	$14.00
#461		⅜" Bull Nose	⅜" Dia. of Circle		¾"	¼"	$15.00
#462		½" Bull Nose	½" Dia. of Circle		⅞"	¼"	$16.00
#464		¾" Bull Nose	¾" Dia. of Circle		1⅛"	¼"	$21.00
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#507		⅝" Pattern	Flush Trim	⅝"	1"	¼"	$16.00
#508		¾" Pattern	Flush Trim	¾"	1"	¼"	$17.00
#366		⅛" **Slot Cutter**	⅜" Deep	1¼"	⅛"	¼"	$14.00
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#212		½" Core Box	round nose	½"	11/32"	¼"	$13.00
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#214		¼" **Straight**	plunge cutting	¼"	¾"	¼"	$ 6.50
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#216		⅜" Straight	plunge cutting	⅜"	1"	¼"	$ 6.50
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#219		¾" Straight	plunge cutting	¾"	1"	¼"	$ 9.50
#220		1" Straight	plunge cutting	1"	1½"	½"	$11.00
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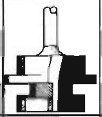
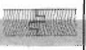
#502		½" Flush	Trimming	½"	½"	¼"	$ 7.50
#503		½" Flush	Trimming	½"	1"	¼"	$ 8.50
#221		½" Flush	Trimming	½"	1 3/16"	½"	$ 8.00
#545		**Tongue & Groove**	Straight 	1⅝"	1"	¼"	$29.00
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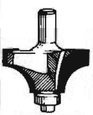
#450		⅛" **Beading**	⅛" R	¾"	⅜"	¼"	$11.00
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#455		½" Beading	½" R	1½"	¾"	¼"	$17.00
#530		3/16" **Edge Beading**	3/16" Dia. of Circle		½"	¼"	$15.00
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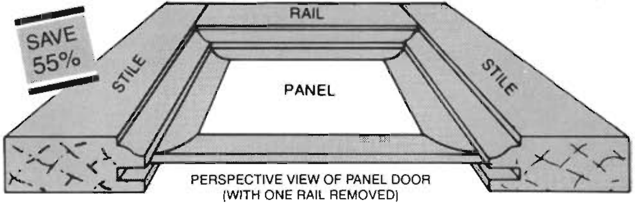

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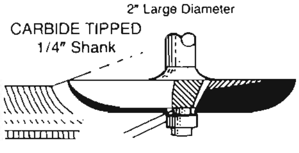

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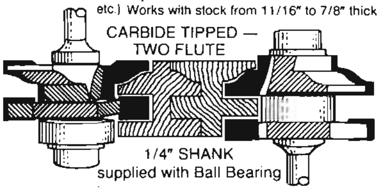

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Videoscene

by Alan Marks

Carve a Bottle-Nose Dolphin with Robert L. Buyer, ©1990 by Buyer Woodcarving Studio, 28 Power Street, Norton, MA 02766, $39.95 (plus $2.00 for shipping), including instruction book, 73 minutes.

Bob Buyer gives a personal and engaging presentation here that overcomes a number of deficiencies in this tape; it's not really up to professional snuff from a technical point of view. It opened clumsily with no music (usually a bad sign) and a shot of an unidentified man (Buyer) walking into a residence in dead silence. At first there were no close-in zooms of the work being discussed. Later, the camera does zoom in, but it should have from the start. Overall, the tape and the 19-page instruction booklet do a good job.

The patterns for the project are in the book so you can photocopy and trace them onto a wood blank. You can choose to make your own blank or buy one ready-made and bandsawn from Buyer. The cost: $9.00 plus $2.00 shipping and handling for a bandsawn 3¼" X 4" X 8¾" basswood dolphin blank. For a mahogany oval base, also bandsawn to shape, $4.00 plus $1.00. This makes it feasible for anyone who doesn't own a band saw to do the project. All that is needed in the way of tools is a good whittling knife and perhaps a riffler or two.

Although the video would appear to restrict itself to carving a dolphin, the dolphin project actually serves as a means to funnel information of a broader nature. Buyer lays out a general approach to doing a representational animal carving in detail. He breaks it down into the following six steps:

1) the research stage, in which resource material is gathered and evaluated;

2) planning the layout, which involves sketching plans and making cardboard patterns;

3) constructing the blank;

4) carving;

5) applying the finish;

6) signing and dating the piece and/or preparing an informative pamphlet about the subject.

All these steps can and will apply regardless of whether you are carving a dolphin or a donkey.

Because of the flat, one-dimensional patterns and drawings in the book, it was difficult for me to assess the curves of the dolphin. Shaded or more three-dimensional drawings would have been helpful, together with cross sections of the body, head and fins taken at strategic points.

This is the second video I've received which deals with carving an animal in the round. It could have been a much more dynamic presentation, but nonetheless it does a good job and is far superior to the carousel horse video reviewed in *PW* #53, March 1990. Buyer loves animals of the sea and has series of instruction booklets available for carving various species of cetaceans, mostly whales. I anticipate a need for more carving project videos.

Carving in the round definitely benefits from a visual presentation, perhaps more than any other woodworking activity (with the possible exception of woodturning) and capable teachers such as Robert Buyer appear to recognize this.

Installing Kitchen Cabinets and Countertops with Tom Law, ©1990 The Taunton Press, Box 5506, Newtown, CT 06470-5506, $19.95, 45 minutes.

Tom Law is fast becoming one of my favorite all-time video instructors. Some time ago I reviewed Taunton's first tape with Tom Law, called "Installing Doors and Windows" (*PW* #52, January 1990). This video takes up a different aspect of finish carpentry, but he comes across here with the same relaxed, easy and confident delivery. And Law displays a new and totally unsuspected talent in the surprise ending to this tape. More about that later.

In this video we take side trips to a cabinet retailer and a countertop shop. Granted these diversions provide some interest, but they don't add much, if anything, to our knowledge of cabinet installation, and they occupy 17% of the tape's running time. Tom Law and the editor did such a terrific job of compressing the installation section, that I wonder if they had to pad the video with this other stuff to give it a creditable length. This might have been done purely for marketing reasons, but because Law's information is so valuable (and hard to come by) I'd recommend you buy the tape even if it were only 37 minutes long.

He uses the water level method of determining a line for the base cabinets, and it's a humdinger. All it took was fifteen feet of clear plastic hose filled with water and a helper to hold one end. This method turns out to be both very accurate and fast. After determining level points on the drywall you simply snap a line across them.

Law goes on to teach how to scribe a base cabinet to an uneven floor, how to set island cabinets and how to fasten a countertop. He also discusses how to deal with concave or convex walls. Whatever your concern, be it routine installation or overcoming problem situations, Law addresses it. I believe you *could* tackle a cabinet installation with full confidence using this tape as a reference.

At the end Law wishes us good luck and walks out of the kitchen and off camera to the staccato accompaniment of a solo snare drum march. The scene shifts to a close-up of the drum being played, the credits start rolling in superimposition and the camera pulls back to reveal the drummer as none other than Tom Law himself. He drums in a "creditable" fashion until the titles run out.

This has to be one of the few manifestations of humor ever to survive the gauntlet at Taunton's video production facility. I loved it. PW

***Alan Marks** designs and makes furniture and cabinets in Carmel Valley, California, and is a Contributing Editor to* Popular Woodworking.

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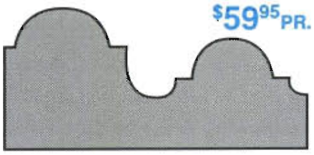

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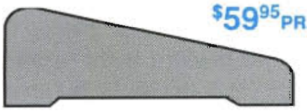

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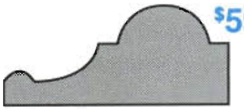

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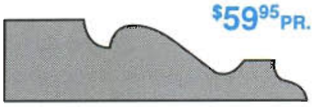

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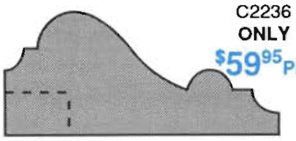

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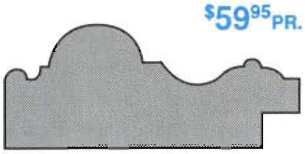

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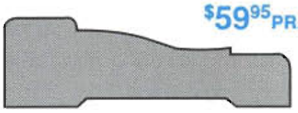

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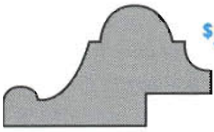

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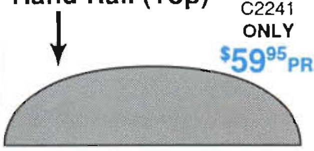

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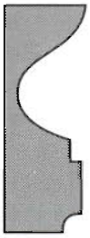

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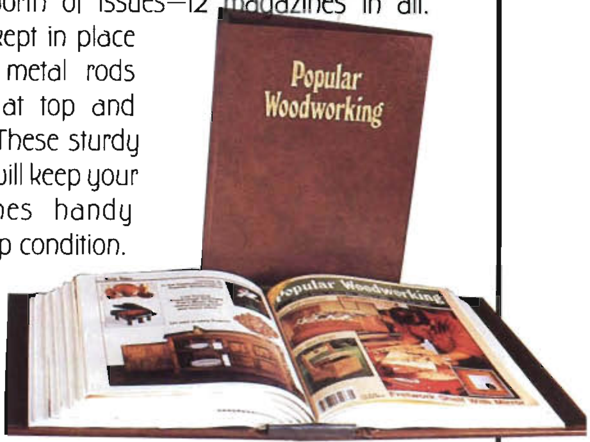

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The Finishing Forum

by Tom Wisshack

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Partly Cloudy

Recently I acquired a round oak table. It's fairly old and the finish appears to be the original. There are, however, some cloudy areas on the surface. Otherwise the finish looks sound. Can it be revived without completely re–doing it?

Dana Miller, West Branch, IA

Most likely the cloudy areas on your round oak table were caused by moisture. Depending on how much the finish has actually decomposed as a result, you may be able to save it. About 60% of the furniture pieces that come into my shop in a similar condition respond to treatment; the rest have to be stripped down and refinished.

Though I do not advocate applying linseed oil to raw wood or old finishes because of the chance of irreversible darkening, I believe in your case it would be safe to try. The solution I recommend is, in fact, the only one I know of that will bring back "dead" or water–damaged finishes. Mix a solution of one part boiled linseed oil and one part turpentine. To this add a small amount of mineral oil and a few drops of japan drier (available at most paint stores). Saturate a pad of fine steel wool with this solution and rub with the grain until you see results. If the finish is going to respond, it will do so after five or ten minutes (many water–damaged finishes respond immediately to this treatment). If you aren't seeing results, try sprinkling the damaged area with pumice stone abrasive powder as you rub. It may help cut through the surface so that the oil can take effect. You will need to rub the entire tabletop in order to keep the tone even.

Clean the solution off with rags or paper towels, rubbing until there is no residue left on the wood. Dunk the rags in water and dispose of them in a sealed container—they are highly combustible. Let your table dry for several days with good ventilation. Afterwards, if the finish is sound, you can finish up with a coat of paste wax. I recommend a hard wax containing carnauba such as clear Trewax®. If the finish appears thin in places or has broken down somewhat as a result of the damage, you'll want to apply an additional finish over the original. You must seal it first for a good bond and then apply a topcoat. Pittsburgh Paints Rez Satin Polyurethane makes an excellent top coat. It is extremely durable and can be rubbed out beautifully without the plastic look associated with most polyurethanes. The company makes a compatible sealer that is of the consistency of water and should be worked into the wood with a brush and the surplus removed with rags. Do not use a so–called "sanding sealer," which is an inferior product. Good luck in saving the original finish of your table—I wish more people would give this a try.

Staining Turnings

I've just built a four–poster bed from alder and would like some finishing advice. The posts are turned and I think staining will make some areas darker.

Frank Morley

The turned corner posts will naturally show some darker areas no matter how you finish them. The end grain is exposed in places and will soak up more stain. This tendency may even be exaggerated in alder, so I suggest you stain cautiously. If you're using a commercial stain, remove about half the contents and put it in a jar or can. Add to this the same amount of turpentine, spice the mixture with about 1⁄4 cup boiled linseed oil, and top it off with a few drops of japan drier. Take a scrap of the wood you used to make the bed, and sand it to the same degree. Try out the stain on this sample—brush it on liberally and when it begins to soak in or haze over, gently wipe it off. Chances are you can safely apply this mixture to your project as a trial stain. If it appears too diluted, simply add more of the original stain. You'll have to experiment to come up with the right tone.

It's easy to go back and darken a surface, but nearly impossible to lighten it once you've made it too dark. The linseed oil makes the mixture spread easily, and gives it a transparent quality and golden tone. Once all oil stains contained it, but today it's usually replaced with synthetics. The japan drier is a safety measure since you are introducing additional ingredients into the commercial stain. View this initial staining as a way to observe how the wood takes the pigment, and plan on applying an additional coat later to get the right tone. This takes patience, but the results are worth it—the best finishes result when the stain is built up in thin layers or washes of color.

Polyurethane will serve as a final finish, but don't expect a hand–rubbed finish to appear magically out of a can. Polyurethanes tend to look "plasticky" when handled wrong, but with the right approach, can look quite rich. Begin by applying a sealer to the stained surface. I suggest Benjamin Moore's Scandinavian Oil Finish. Contrary to the name, it is actually a penetrating sealer and varnish that I've found very compatible with polyurethanes. Brush it on liberally, working it well into the pores of the wood. Wipe off the surplus with rags within a few minutes. In a day or two hit it lightly with fine steel wool and vacuum it thoroughly. Don't be surprised if a little stain comes off in the process—it's perfectly natural to lose a little.

I've tried all the polyurethanes and find Pittsburgh Paints Rez Satin to be the best—capable of the richest results. Since parts of the bed are turned and brushing on the final coats could be a problem, try applying a wiped finish. Cut a square foot or so from an old cotton T–shirt and form it into a ball. Tie the loose ends with

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***Thomas Wisshack** is a maker, restorer and finisher of fine furniture in Galesburg, Illinois. He's had over thirty years' experience in woodfinishing, including several trips to Germany where he studied and worked at his trade.*

a rubber band and hold this part in your hand. Dampen the ball with turpentine to lubricate it, and dip it into the polyurethane (placing it in a pie pan works great). With deft strokes you should be able to apply a beautiful thin coat to the turnings, and with more practice you'll be applying a flawless layer to the flat portions of your bed. Remember that the polyurethanes begin drying or hazing over almost immediately, so you don't get a second chance.

If your finishing room is relatively clean and you take the precaution of wetting down the floors prior to finishing, the individual coats will be much less likely to collect dust than a brushed–on finish. If necessary, sand lightly with worn 400–grit wet or dry paper between coats. I recommend four to six coats of the wiped–on polyurethane; then allow about a week for the final coat to cure. Hand rub the finish. Saturate a pad of 0000 steel wool in mineral oil and sprinkle it with rottenstone abrasive powder. Rub one area at a time and check your progress often—there's always the danger of rubbing too hard and going through. The result should be a velvety smooth, satiny surface. Remove all traces of the oil solution with soft rags. No further waxes or polish should be needed.

Besides Rustoleum®

What kind of finish is best on ironwood? It grows in southern California, Arizona and Mexico. I've used several kinds of plastic finishes and haven't been happy with them. They don't seem to adhere or they soak in and look as though nothing has been applied.

Jack Parker, Joseph, Oregon

You need a finish appropriate for ironwood—one that penetrates and locks into the fibers. Synthetic varnishes, polyurethanes and plastic finishes are all inappropriate because they form a film that sits on top of the wood and may not bond properly with it. When I work with extremely hard, dense, resinous woods, I choose an oil finish. You can choose from among several types depending on how much protection you need. The September 1989 issue of Popular Woodworking (#50) contains my directions for making and applying your own simple oil finishes. Much of the success of this type of finish depends on having a flawless, super–smooth surface. It's also a good idea when working with woods like ironwood to warm the solution for maximum penetration, and to add a bit more japan drier and wait longer between coats. This type of finish can be renewed or touched up quite easily. For more durability, follow up with a coat of paste wax.

For a more waterproof or wear–resistant finish on ironwood, try one of the commercial penetrating oils or sealers. Watco Danish Oil will give moderate protection and should be compatible with the wood. Benjamin Moore's Scandinavian Oil Finish contains the most solids of all the finishes of this type, and can be built up into quite a durable coating with enough coats. Apply it with a brush, allowing it soak in for a few minutes and then removing all surplus with soft rags. This way, only the amount that penetrates will be left on the wood—a method that should do away with any bonding problems you've had. PW

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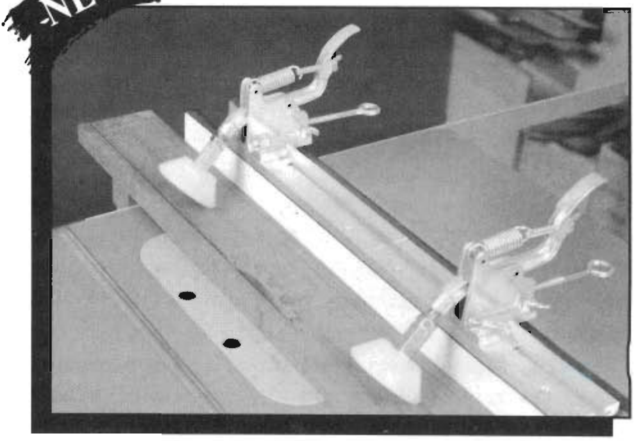

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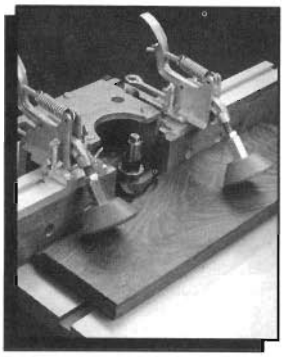

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Tried and True

by Graham Blackburn

Making Your Point

"Measure twice and cut once" is good advice, but marking carefully is equally important. Too often we pay scant attention to how we measure and mark—and end up with poorly fitting work. Any old pencil used with the nearest measuring tape may not be right for the job.

For house framing and working with 2 X 4's, measuring to the nearest ⅛" is sufficient. When carpenters need more accuracy, they say so many inches and a "fat" eighth, or five eighths and a "hair," or so many eighths "full" (or "bare"). To mark such measurements on construction grade lumber, a normally sharpened pencil is fine. But cabinetmaking, finish carpentry, and furniture making require more care. I'll examine tools used to measure and mark wood, and discuss how to use them to achieve the accuracy needed for the job at hand.

***Graham Blackburn** is a furniture maker in Rio del Mar, California, and the author of many books on woodworking including* The Illustrated Book of Housebuilding and Carpentry.

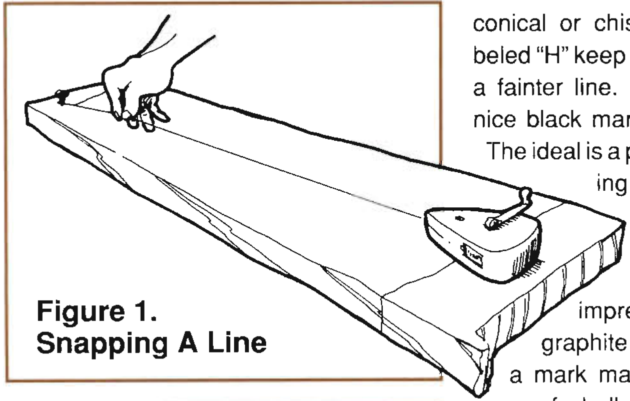
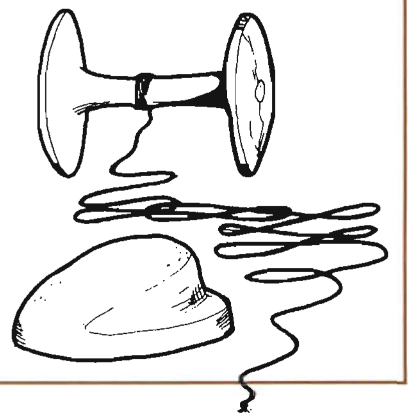


Figure 1.
Snapping A Line

Figure 2.
Wooden Reel, Line & Chalk



author

Pencil and Chalk

In my experience the carpenter's pencil, an extra thick–leaded, oval pencil, barely serves even for rough carpentry unless constantly sharpened to a flat point. Its oval shape, while presenting a good surface for lumberyard ads, makes it hard to keep handily tucked behind the ear. It's useful for making large marks on concrete or foundation work, but the soft lead quickly wears down to a point a good ¼" thick.

More useful, especially in woodworking and finish carpentry, is a regular pencil of medium hardness sharpened either to a conical or chisel–like point. Pencils labeled "H" keep their point longer but leave a fainter line. Pencils labeled "B" leave nice black marks but wear very quickly. The ideal is a pencil marked "HB" indicating medium hardness and a fairly visible degree of blackness.

Pencils often leave an impression, however, and their graphite is not as easily removed as a mark made with chalk. The same goes for ballpoint pens, felt–tipped pens, and other ink markers. Felt markers are especially liable to leave marks that bleed far beyond the point you're marking.

Chalk has thus long been used to mark wood. Before encased lines, wooden reels (Figure 2) were common. You wound the line by hand around the reel when not in use. To "chalk it up," you rubbed the line against a solid lump of chalk. Nowadays we have the encased chalk line (Figure 1), especially useful for marking a long, straight line on plywood, gypsum board, and other long pieces. The line is pulled from the case and stretched tautly between two end points, and then "snapped" smartly so that a line of chalk is shaken off the string onto the work. To produce a perfectly straight line, you must lift the string or cord perpendicularly—not at an angle to the work. The tighter the line is stretched the less it will have to be lifted, and the more accurate will be the mark.

Knives and Awls

When more precision is needed, neither chalk nor graphite will do. In these cases the best method of marking is to use some form of incision. Often this means scratching a line with a knife edge or sharp point. Depending on the sharpness of the tool, this method makes possible accuracy up to 1⁄64".

Most awls—all basically no more than sharp metal points with wooden handles—are intended primarily for making small holes. They include belt awls, brad awls, carpet awls, magazine awls (containing different sizes of points within their handles), marking awls, peg awls, scratch awls, stabbing awls, and upholsterer's awls. Long–bladed scratch awls (Figure 3) are best for marking with since the blade length enables them to reach into otherwise inaccessible places, as when scribing around dovetails to lay out the matching pins.

The common marking awl (Figure 3)—a much shorter tool often provided with a small metal cap at the end of the handle, allowing the tool to be hit with a hammer without damaging the handle—is far commoner. But not only is the blade often too short, it's also considerably stouter than that of a scratch awl and is rarely sold with anything more than the mildest of sharp points. This is because the tool is intended to be driven into the wood—which might break off a thinner point.

Knives intended for marking are made in a variety of designs. A design once so common that it virtually constituted the standard bench knife is the Sloyd knife (Figure 4). This is only useful for marking if the blade is kept sharp and the tip pointed.

Composite marking awls and marking

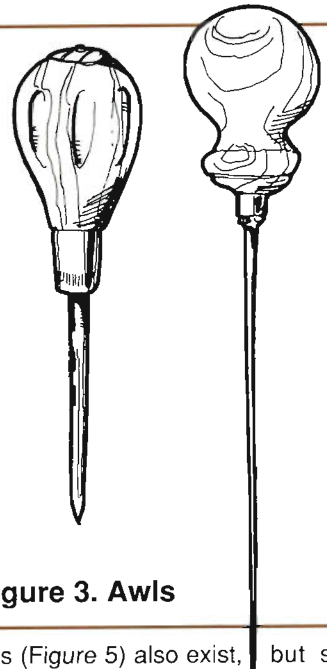


Figure 3. Awls

blades (Figure 5) also exist, but since they are double–ended and have no handle, they can be dangerous.

A useful traditional Japanese tool is the marking knife (Figure 6). Usually sold unhandled, it should be provided with both a handle and a sheath before use. Made of laminated steel, it can take a very sharp edge and should be sharpened with the same care as a high quality chisel. Its characteristic, diagonally formed single–bevel blade is well suited for marking in combination with straightedges and try squares, since the flat side of the blade allows you to draw it along the guiding tool with utmost accuracy.

It's often helpful when marking layout lines to make the mark with the sharp point of an awl or knife, and then, using an extremely sharp pencil, run the point along the scribed line. This makes the line more visible and avoids the danger of having strong grain deflect a thin pencil point.

Although there are a number of other tools that mark, most of them do so as a function of some other purpose, such as the various marking and mortise gauges used to scribe lines, and instruments such as compasses that can be used in woodworking to mark lines. The tools described above, however, comprise all that you'll need for general marking.

Measuring and Guiding

Marking is rarely enough—you usually need a measuring or guiding device. This means not only a calibrated and graduated rule or tape, but also an edge—straight or curved—against which to guide the marking instrument.

The unit of measurement is unimportant. Although inches and feet are common in America, and the metric system is the norm in other parts of the world, any standard will work if used consistently. Of course, it helps if your tools are made in the same units as the measurement system you use—so that a ¼" groove may be conveniently cut with a ¼" chisel—but relative proportion is more important in good design than actual measurement. Nevertheless, using straightedges, try squares, bevels, and other guiding and layout tools graduated with some form of calibration is invariably an advantage.

Straightedges, Rules And Tapes

A simple length of straight wood may serve as a convenient straightedge for testing and marking. It may be made in almost any size convenient for the job at hand, but remember that a good straightedge should be straight two ways: along the flat and along the edge. Test by drawing a line with the straightedge; then flip it over and check the edge against the line. Remember that under different conditions some woods remain more dimensionally stable than others. If you intend keeping a user–made straightedge for any length of time, it pays to make it out of a relatively straight– and close–grained wood such as mahogany or maple.

For extreme accuracy—indeed, for accuracy greater than it's possible to take advantage of with a material so essentially alive and changing as wood—a machinist's straightedge is the best possible device for ensuring both maximum flatness and straightness. Despite its apparent simplicity (usually ungraduated), the machinist's straightedge is an expensive precision instrument. It should be handled with care, laid down flat, protected from extremes of temperature, and kept in a case when not in use. If you do all this, you will have at your disposal a sure way of gauging perfect joints.

Figure 4. Sloyd Knife

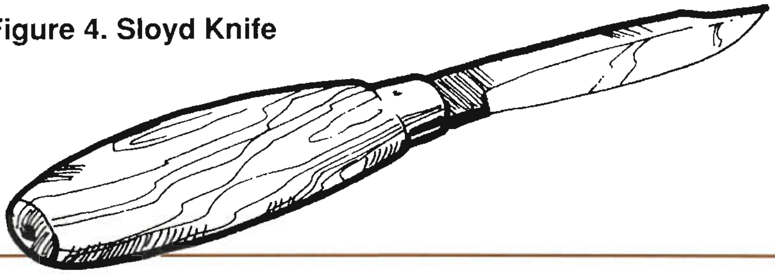


Figure 5. Combination Marking Knife And Marking Awl

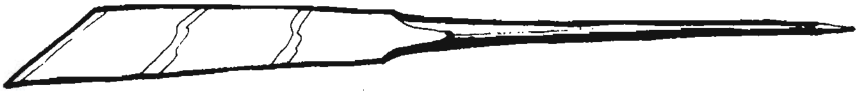
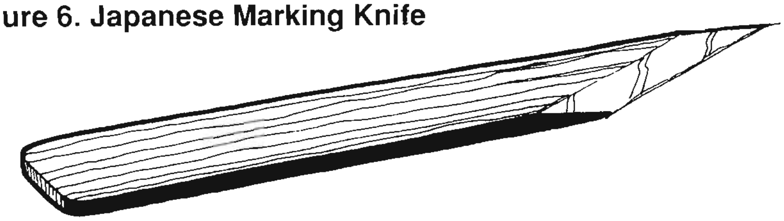


Figure 6. Japanese Marking Knife



One wooden straightedge graduated in inches may be used to measure distances, but two ungraduated straightedges may also be useful for measuring distances not otherwise conveniently measurable. Such a pair of straightedges are known as pinch–rods, and can be used to take off inside measurements as shown in Figure 7. You can also use a pair of short wooden straightedges to measure flatness, twisting, or winding in a board or of a surface (such as your benchtop) by employing them as winding sticks (see *Popular Woodworking* #57, November 1990).

Graduated metal rules come in a variety of lengths from as short as a foot to as much as six feet. Some of the larger ones may be fitted with right–angled cross bars, enabling them to be used as giant T–squares or try squares, and are especially useful when measuring and marking large sheet material like composition board or drywall.

For many years woodworkers used folding rules (Figure 8). There are some who still maintain that these have advantages as yet unsurpassed by the now more common metal tape measure. Made in a variety of lengths from six inches to four feet, and in several different folding patterns, the folding rule may be conveniently carried in an apron or back pocket. Skilled users become adept at flicking them open and shut, but the beginner may find himself frustrated by a tool that always seems to be folded the wrong way!

Another type of folding rule, equally awkward until you get used to it, is the zig–zag rule (Figure 8). This has the advantage of greater unsupported rigidity than a metal tape, but it's more fragile.

Both types of folding rule were made in an enormous variety of graduations, often with additional features such as protractors, built–in levels, and imprinted tables. The addition of a sliding tongue allows you to take depth measurements as well as accommodate odd distances not easily measured by the length of one fold. The practice of importing many tools from Britain led to some confusion regarding the system of graduation. British rules are graduated from left to right, but American rules are graduated from right to left! Which is better is up to you.

Tapes—now invariably made of metal—were originally made of cloth. This has the advantage of lightness in great lengths, but is subject to wear and stretching and is now seldom seen.

Squares and Bevels

The last group to consider is a complicated group of measuring and guiding tools. The common try square and its adjustable cousin used for non–rectangular work, the bevel, are familiar enough. Older models are invariably superior once their truth is checked and, if necessary, adjusted by a little draw–filing. Both old and new may be plain or graduated.

Larger squares known as framing or carpenter's squares (as useful in a furniture shop as on a building site) are famous for the tables and calibrations often inscribed on them. They form the slide rule of woodworking, and can be as complicated to use. Whole books have been devoted to their use, detailing the ways whereby all manner of complicated cuts and angles can be reckoned and marked with precision.

Marking Techniques

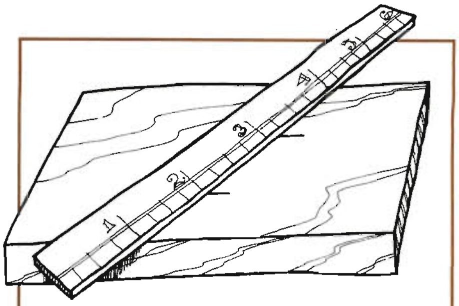


Figure 9. Dividing A Board Into Thirds

If you want extreme precision, you'll need fine instruments. It's also important to use them skillfully and with the appropriate guiding device. For instance, when taking off measurements from a graduated rule, increase accuracy by holding the rule so the graduation is in direct contact with the work. Since most rules are inscribed only on their top surface, this means tilting the rule so the actual indentation touches the work. If the marking instrument is sharp enough, it will ride in the indentation and your measurement will be precise.

Metal tapes are usually provided with a hook at the end, fixed so that it moves by as much as its own thickness and thus allowing you to take accurate measurements with the hook over the end of the work or inside it. But you'll achieve greater accuracy if you get into the habit of measuring from within the tape. Start from some other point than the very end—the 2" mark, for example—and subtract this amount from the final figure. The same procedure is especially advisable when using wooden rules since they usually become worn at the ends.

Often you need to divide a piece into equal parts but there are no convenient units on your rule. The trick is to skew the rule or tape until the required number of divisions on the rule can be fitted across the piece (Figure 9).

One last tip for making your mark is to use what nature has provided you with—your own hand. Run a pencil down a piece of wood with one or two fingers of the hand holding the pencil hooked over the edge of the wood—you'll achieve a remarkably consistent line. This is a down and dirty way of being able to dispense with a gauge, and with a little practice you'll be able to duplicate measurements with surprising accuracy. PW

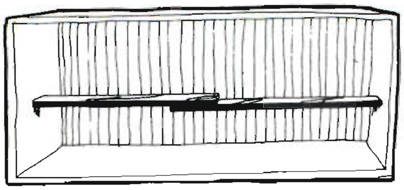


Figure 7. Using Pinch–Rods

author

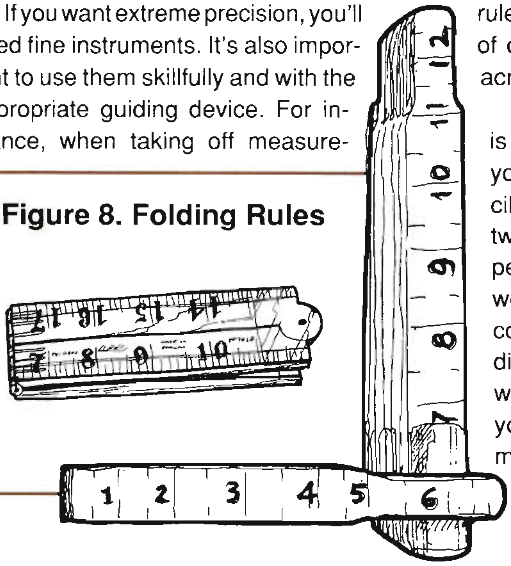
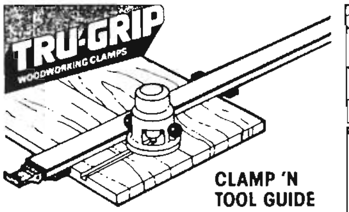


Figure 8. Folding Rules



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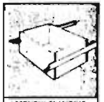

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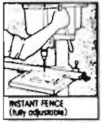

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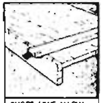

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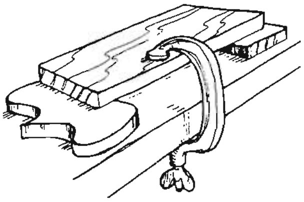

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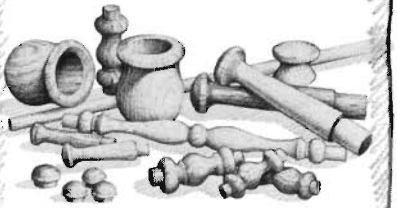

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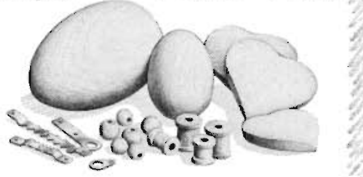

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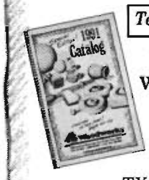

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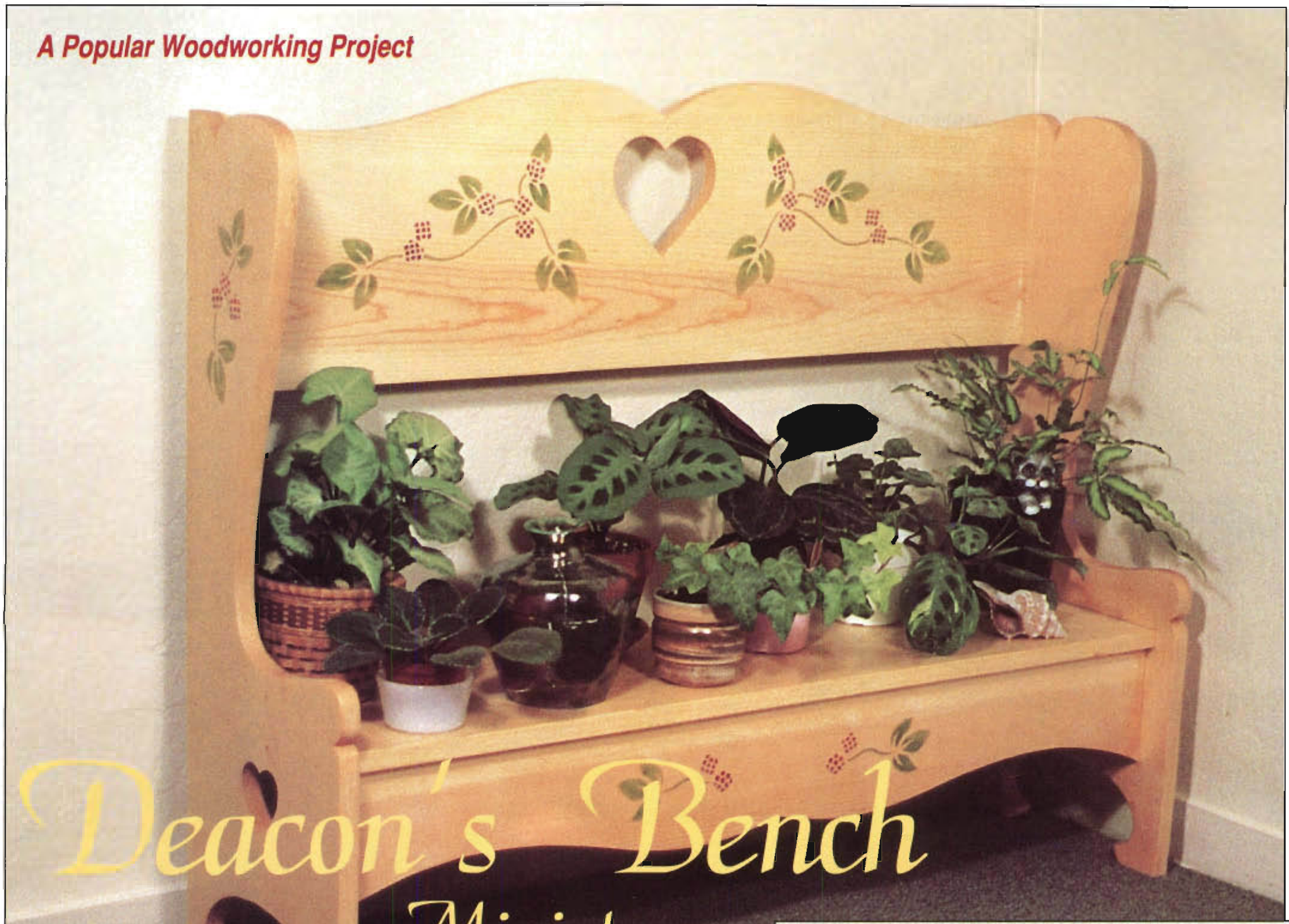
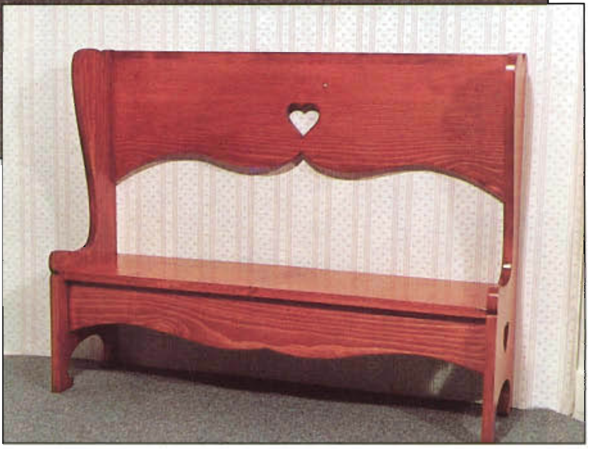


Carol Law



by James A. Johnson

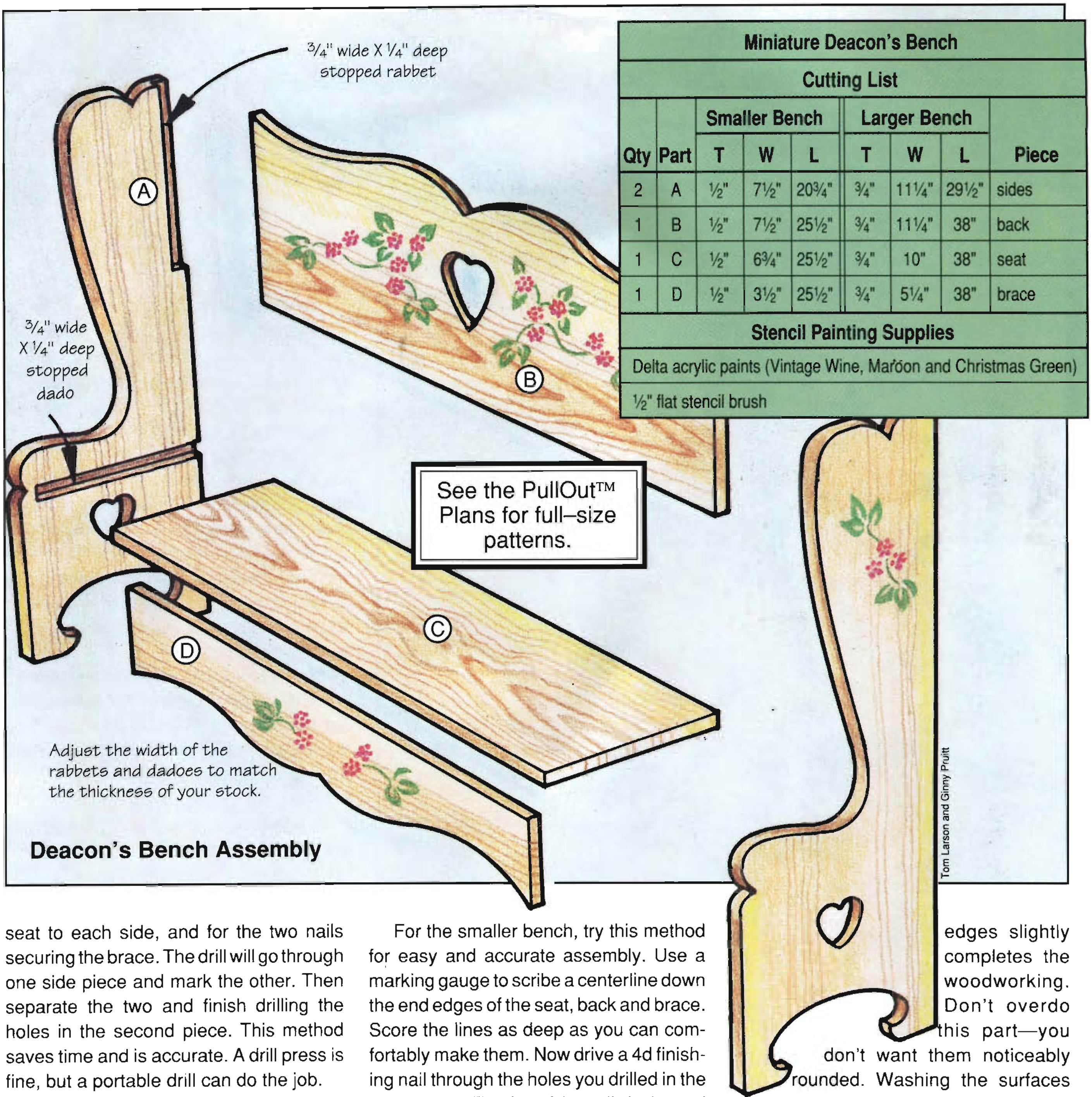
Here's a fine way to display plants and flowers, dolls, toys, and other collectibles. With a stenciled or tole painted finish, it looks great all by itself. The full–size patterns in the PullOut™ Plans section of the magazine provide two different designs in two sizes, and can easily be modified to suit your taste or home decor. The smaller version goes together with butt joints and a few finishing nails, while the larger model requires stopped grooves in the sides to hold the back and seat boards.

I used 1 X 12 pine for the sides, seat and back, and a narrower board for the brace. If you're making the smaller size bench, you'll need boards about 7½" wide for the sides, and you might want to plane all the stock for the smaller bench down to ½" thick. Transfer the patterns, including the hearts and construction lines, to the wood and use a scroll saw to cut out the curved pieces. A saber saw will do, but you may find it difficult keeping the edge square with the surface. The secret is to cut very slowly. Cut the back and the brace curves, too. Now put the back and the brace on the seat and cut them all the same length. If you're making the larger bench, trim ¼" off each end of the brace because the seat and back will be let into grooves in the sides.

Use a square to draw a light centerline on the back of the back (B) and the brace (D). Don't press hard because the line must be removed. The heart cut–outs should line up on the centerlines. If you have a scroll saw, cutting them out is a piece of cake. Otherwise, you may want to modify the pattern slightly so they can be cut with a drill and saber saw. Drill a pair of holes between ¾" and 1½" diameter, depending on the size heart you want, so they overlap slightly at the centerline. Then drill a small hole on the centerline just below to locate the bottom of the heart. Draw lines tangent to the larger holes to the smaller one, and carefully cut them with the saber saw.

If you're making the smaller bench, clamp the two sides together and drill three evenly spaced 1⁄16" or 3⁄32" holes for the nails that will hold the back. Locate them as shown on the full–size pattern. Do the same for the five or six nails that hold the

***Jim Johnson** crafts wood in Brunswick, Ohio.*


¾" wide X ¼" deep stopped rabbet
Ⓐ
Ⓑ
¾" wide X ¼" deep stopped dado
Ⓒ
Ⓓ
See the PullOut™ Plans for full–size patterns.
Adjust the width of the rabbets and dadoes to match the thickness of your stock.

Deacon's Bench Assembly

Tom Larson and Ginny Pruitt

Miniature Deacon's Bench

Cutting List

Qty	Part	Smaller Bench T	Smaller Bench W	Smaller Bench L	Larger Bench T	Larger Bench W	Larger Bench L	Piece
2	A	½"	7½"	20¾"	¾"	11¼"	29½"	sides
1	B	½"	7½"	25½"	¾"	11¼"	38"	back
1	C	½"	6¾"	25½"	¾"	10"	38"	seat
1	D	½"	3½"	25½"	¾"	5¼"	38"	brace

Stencil Painting Supplies

Delta acrylic paints (Vintage Wine, Maroon and Christmas Green)

½" flat stencil brush

seat to each side, and for the two nails securing the brace. The drill will go through one side piece and mark the other. Then separate the two and finish drilling the holes in the second piece. This method saves time and is accurate. A drill press is fine, but a portable drill can do the job.

For the larger bench, cut a stopped dado across the side for the seat as shown on the pattern and a stopped rabbet for the back piece. Use a straight bit in the router, set the depth to ¼", and clamp a straightedge to the piece to guide the tool. After cutting the groove to the same width as the boards you're using, square up the stopped end with a sharp chisel and check the fit. Use the router to cut the rabbet for the back, too.

Now you're ready to sand all the pieces. I used 60–grit to remove all scratches and marks, and finished with 100–grit which left the pine smooth enough for finishing.

For the smaller bench, try this method for easy and accurate assembly. Use a marking gauge to scribe a centerline down the end edges of the seat, back and brace. Score the lines as deep as you can comfortably make them. Now drive a 4d finishing nail through the holes you drilled in the side pieces. The tips of the nails in the end holes should protrude about ⅛". Fit these nail points into the grooves you just scribed in the edges of the other parts. When they're lined up, pound the nails almost flush.

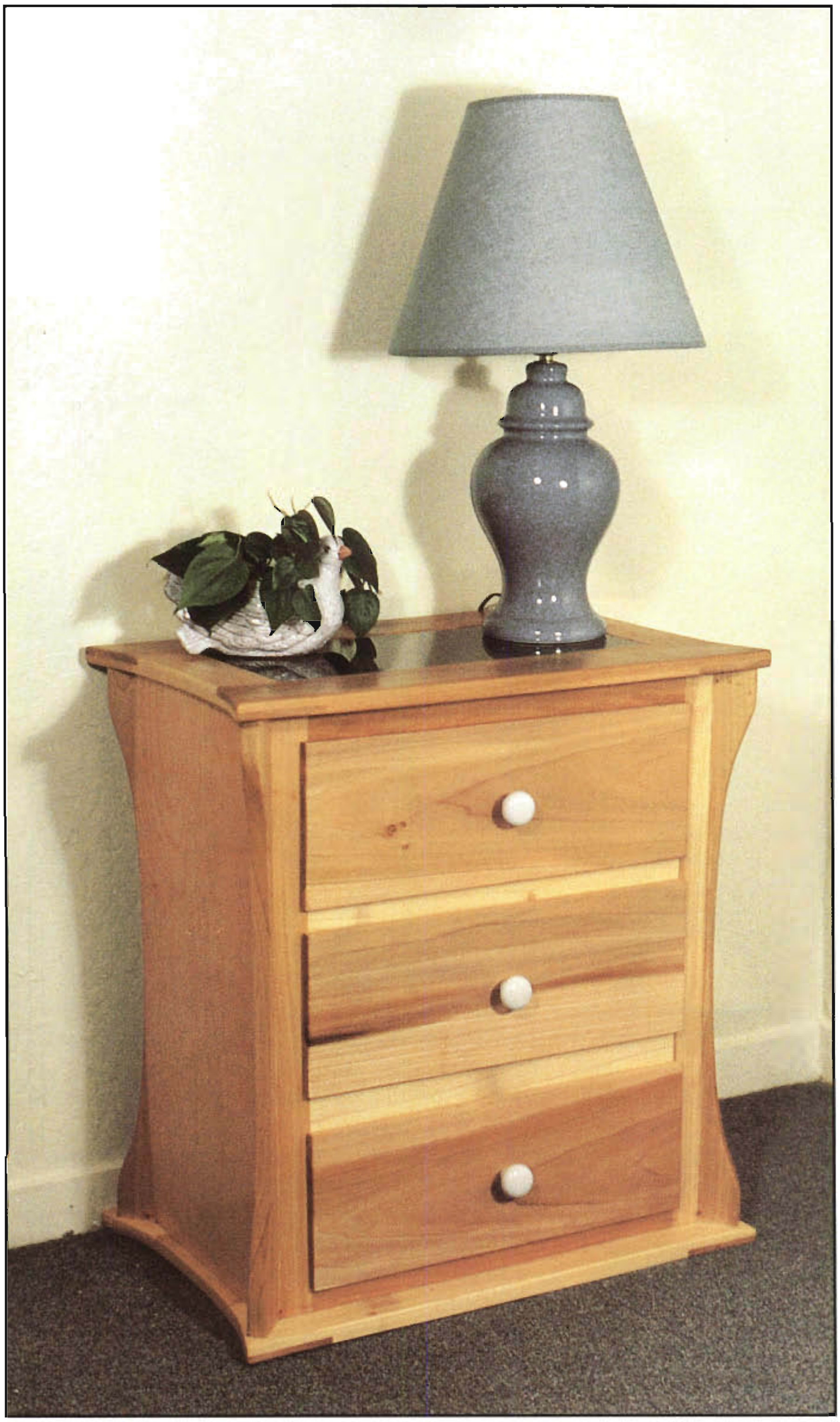
Turn the job over and repeat the work on the other side. Set the nail heads and finish the holes with a little wood filler.

If you've cut dadoes and rabbets for the larger bench, drill holes for nails and apply glue in the grooves. Assemble the pieces and drive the nails home. You won't need clamps, but be sure the assembly is square.

A little hand sanding to "break" the edges slightly completes the woodworking. Don't overdo this part—you don't want them noticeably rounded. Washing the surfaces down with mineral spirits will remove all sanding dust. Apply a coat of sealer to fill the pores so paint or stain will take smoothly and evenly.

If you like the berry vine motif in the photo, transfer the stencil design to card stock and cut it out with a sharp knife. Using the supplies listed above, put very little paint on the brush tip and "stomp" it through the stencil. Use varying amounts to achieve shading effects. Furniture wax will finish the job unless it will be displayed outdoors; then a waterproof varnish or lacquer should be used. PW

A Nightstand



Carol Law

by Donald Lee

When I read the "Design Your Own Furniture" article (*PW* #53, March 1990), I was inspired. I decided I wanted to design a nightstand that would be unique, yet relatively easy and inexpensive to build. I also wanted someone to be able to build it with just a few power tools if necessary. I came up with a design I feel even an inexperienced woodworker could enjoy building.

I decided to use poplar for the framework and drawer faces and birch plywood for the panels. Keeping in mind the grain patterns and finished hues of the woods, use whatever fits best in your home.

Cut the face frame stiles (A) and rails (B) to the designated Cutting List dimensions. Set these pieces aside for now. You'll be making the rabbet and dado cuts in them later, along with some other parts.

Next, cut the drawer frame sides (C), ends (D), and kickers (E). Although there are only three drawers, you'll need an additional frame for structural support around the top of the unit. The drawer frames will take a lot of wear, so be sure to use hardwood.

The frame for the top and bottom of the night stand are the same; refer to the Cutting List and cut four pieces for the sides (F) and four pieces for the ends (G).

Cutting Lap Joints

Now you're ready to cut the $^3/_8$" deep dadoes and rabbets for the lap joints in the materials you've prepared. Remember, what you really want is the exact width and half of the exact thickness of the overlapping piece, so measure and cut accordingly. Set your dado blade to its widest setting, and at a depth that removes half the thickness of your material. Clamp a stop block to the fence to establish the shoulder of the rabbet, and make repeat cuts to remove the rest of the waste.

Start with the pieces for the top and

***Donald Lee** is a woodworker from Cressona, Pennsylvania.*

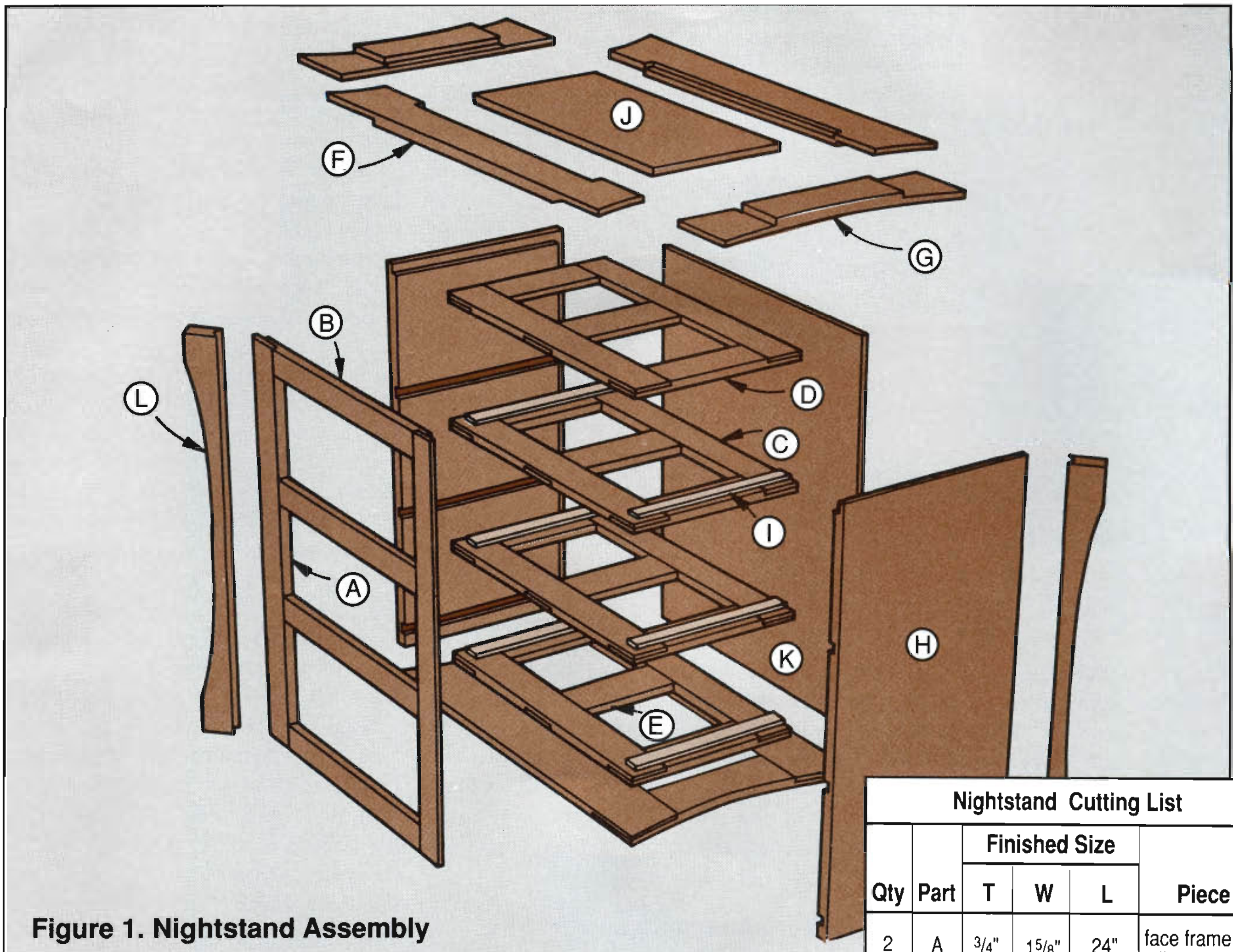


Figure 1. Nightstand Assembly

Tom Larson

Qty	Part	T	W	L	Piece
		Finished Size			
2	A	3/4"	1 5/8"	24"	face frame stiles
4	B	3/4"	1 5/8"	20"	face frame rails
8	C	3/4"	2 1/2"	19 1/2"	drawer frame sides
8	D	3/4"	2 1/2"	11"	drawer frame ends
4	E	3/4"	2 1/2"	11"	drawer frame kickers
4	F	3/4"	3 5/8"	24"	top/bottom frame sides
4	G	3/4"	3 5/8"	15"	top/bottom frame ends
2	H	1/2"	11"	24"	side panels
6	I	3/8"	1"	10 1/2"	drawer guides
1	J	1/2"	8 1/2"	17 1/2"	top inset
1	K	1/2"	19 1/2"	24"	back panel
4	L	3/4"	1 1/2"	24"	corner posts
3	M	3/4"	6 1/2"	17 5/8"	drawer fronts
6	N	1/2"	5 1/2"	9 1/2"	drawer sides
3	O	1/2"	5"	16 1/8"	drawer backs
3	P	1/4"	16 1/8"	9 1/2"	drawer bottoms

Nightstand Cutting List

bottom frames (F and G), and cut a 3/8" deep by 3 5/8" wide rabbet on the end of each piece (see Figure 1). You'll want the side pieces to lap over the end pieces on the surface to be displayed, so match the wood before cutting. For these pieces, set the stop block at 3 5/8" from the outside of the blade.

When you're done with that setup, move the stop block to 2 1/2" from the outside of the blade to cut the rabbets for the drawer frame members (sides, ends, and kickers) as shown in Figure 2. Cut the rabbets on the same side for each piece. Next, take the drawer frame sides and measure 8 1/2" and 11" inches in from one end on each, and cut 3/8" dadoes between those marks to accept the kickers.

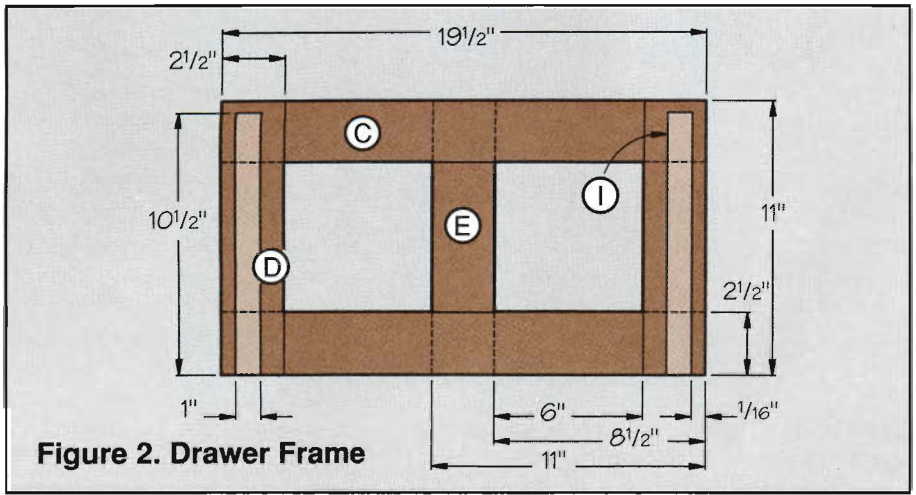


Figure 2. Drawer Frame

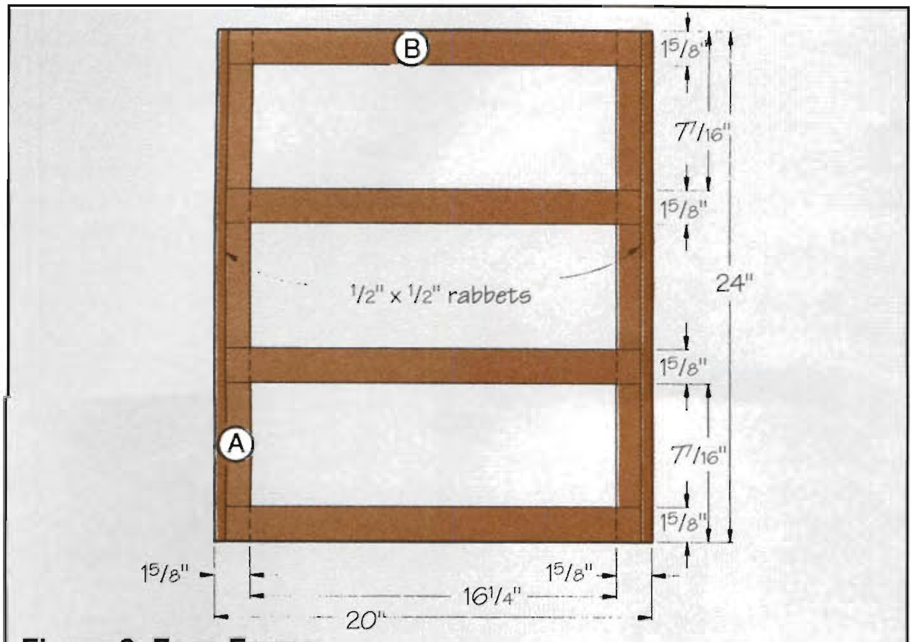


Figure 3. Face Frame

For the face frame, cut a 3/8" deep by 1 5/8" wide rabbet on the end of each stile and rail as shown in Figure 3, keeping them on the same side of each piece. For the stiles you'll want to keep your best surface on the opposite side of the cuts, while for the rails you'll want the preferred surface on the same side as the cuts. Measure in from each end of the stiles 7 7/16" and 9 1/16" to locate the dadoes for the center rails (See Figure 3). Set up and cut each of these on the same sides as the rabbet cuts.

At this point you are ready to glue and clamp all the lap joints you've prepared. Dry assemble each section, and check to make sure they are square and the pieces flush with each other. When you are satisfied, spread the glue evenly on each joint you are clamping, checking again that they are square and the edges are tight. Let them set over night.

More Machining

When the face frame assembly is dry, cut a 1/2" by 1/2" rabbet on the back of the stiles to accept the side panels (H) as shown in Figure 6. Next, cut out the arcs on the ends of the top and bottom frame assemblies using the full–size pattern in the PullOut™ Plans. You can also cut the drawer guides (I) and screw them to the drawer frames (see Figure 2).

Use a 3/8" rabbeting bit with a roller guide to rout out a 1/2" deep by 3/8" wide rabbet around the top inside edge of the top frame and square the corners with a chisel. There are a lot of possibilities when it comes to the inset piece. You could use 1/2" smoked glass, marble, or Corian®. Another option is to use 1/2" plywood and match the sides. If this is the way you go, then cut the piece with the grain running lengthwise. The dimensions of the inset piece (J) are given in the Cutting List, but, for accuracy, check the actual dimensions after you've routed the rabbet.

Preparing the 1/2" plywood side panels (H) is the next step in the process. Cut both sides to the Cutting List's *dimensions*. Set these aside and cut the 1/2" plywood back panel (K) to size.

Figure 4 shows the locations for the rabbets and dadoes on the side and back panels but it's best to use your face frame dimensions as a reference. You want the top surface of the drawer frames to be flush with the top of the rails on the face frame. As you cut these dadoes and rabbets, make sure the sides mirror each other so you end up with both a right and a left.

Next cut the four corner posts (L) to size. Before you cut out the arc, cut the V-

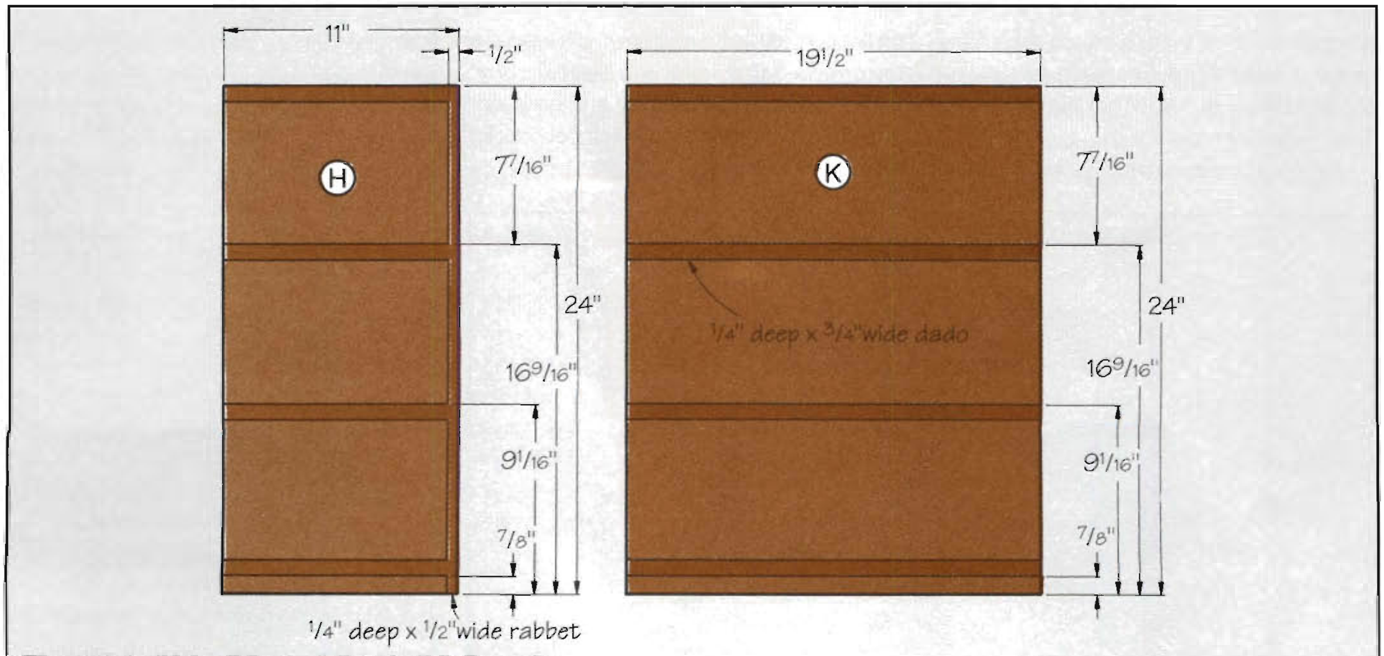
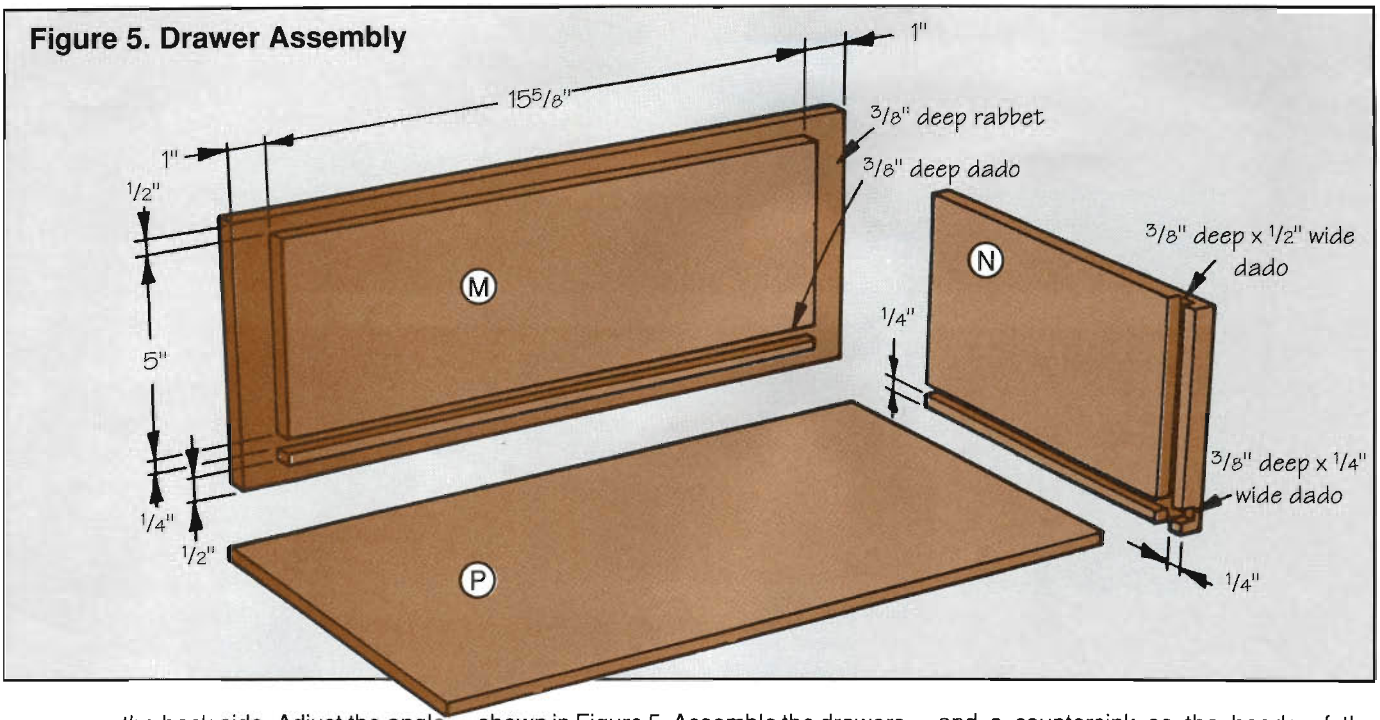


Figure 4. Side (H) and Back (K) Panels

Figure 5. Drawer Assembly



groove on the back side. Adjust the angle on the table saw blade to 45° and set the fence 3/4" from the outside edge of the blade where it enters the table. Set the blade height to around 5/8", and make a few test cuts on some 3/4" scrap, adjusting until you get the correct depth. Trace the full-size pattern for the posts from the PullOut™ Plans section to each post, and carefully cut out each arc. Clamping and sanding the four pieces together will give you more uniformity.

Making the Drawers

The next phase of construction is to make the drawers. Cut the drawer fronts (M), sides (N), back (O), and bottoms (P) to size and rabbet and dado the parts as shown in Figure 5. Assemble the drawers with glue and nails. Don't glue the bottom in place; just slip it into the groove after the four sides are assembled, and nail it into the drawer back.

To assemble the case, lay the back on top of four pipe clamps positioned at each dado. Spread some glue in the dadoes and set the four drawer frame assemblies in place. Spread glue in the side dadoes, fit them to the rest of the assembly, tighten the clamps, and place four clamps across the front in the same position. Make sure the assembly is square and then let it dry. Later, install and glue on the face frame.

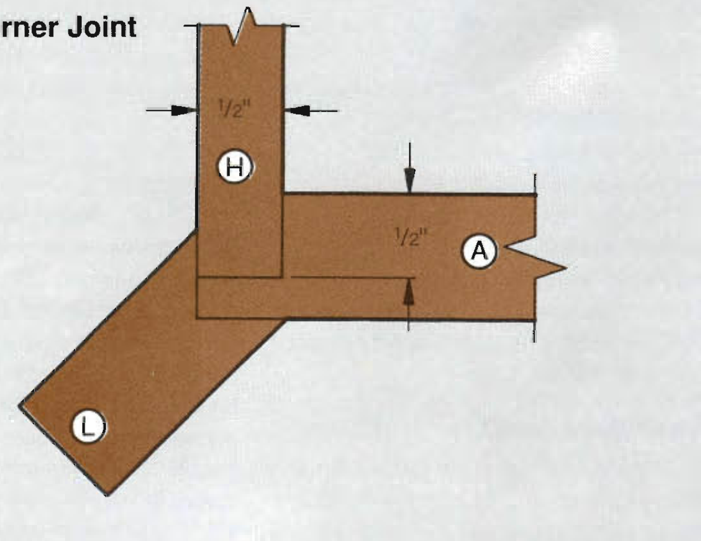
Attach the bottom with glue and 1 1/2" #8 flathead wood screws into the sides. Predrill the holes with a tapered drill bit and a countersink so the heads of the screws will be slightly inset. Before you turn it over, put glue along the back of each of the four corner posts (in the V-groove) and attach each with one screw through the bottom frame and into the post.

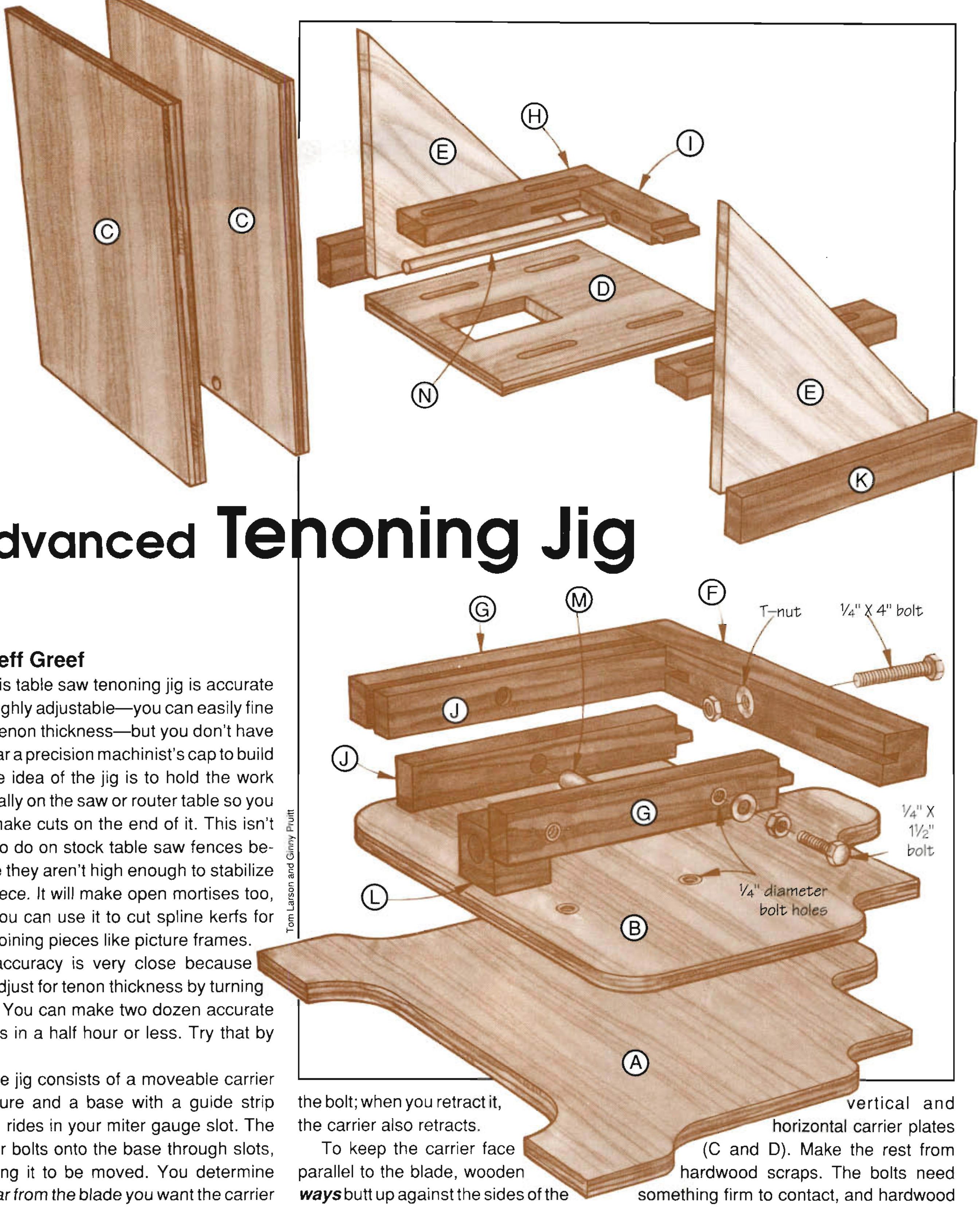
Attach the top in pretty much the same way, but using only a couple screws in each corner: one for the corner post and one into the corner of the top interior support piece. You'll also need to countersink the holes 1/4" so they can be plugged. Use a 3/8" plug cutter to cut your plugs out of some of your scrap hardwood. The plugs only need a little glue and look best if the grain is running parallel. Sand them down when they're dry.

To get a smooth finish, start by sanding thoroughly with 100-grit sandpaper and work your way up to 220. I sealed the sanding with a mixture of three parts mineral spirits to one part boiled linseed oil. I choose to go with the natural wood hues, but you could stain to a desired color at this point. For the finish I used a mixture of two parts boiled linseed oil and one part turpentine. Rub each coat in and let it dry completely. Between coats go over the surface with #0000 steel wool. It will take several coats, but the results are worth it.

After the final coat of oil is applied, let it dry for several days and then rub in pure lemon oil and buff dry using a circular motion. Once you're done you will have a unique piece of furniture that will enhance your home while giving you years of practical service. PW

Figure 6. Corner Joint





Tom Larson and Ginny Pruitt

Advanced Tenoning Jig

by Jeff Greef

This table saw tenoning jig is accurate and highly adjustable—you can easily fine tune tenon thickness—but you don't have to wear a precision machinist's cap to build it. The idea of the jig is to hold the work vertically on the saw or router table so you can make cuts on the end of it. This isn't safe to do on stock table saw fences because they aren't high enough to stabilize the piece. It will make open mortises too, and you can use it to cut spline kerfs for end–joining pieces like picture frames. The accuracy is very close because you adjust for tenon thickness by turning bolts. You can make two dozen accurate tenons in a half hour or less. Try that by hand.

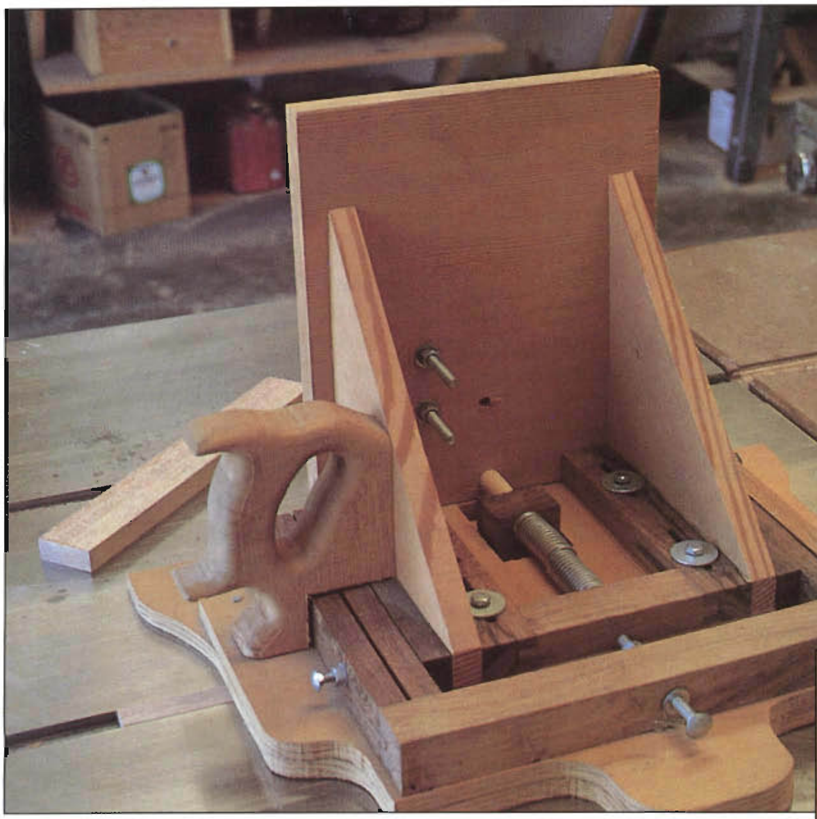
The jig consists of a moveable carrier structure and a base with a guide strip which rides in your miter gauge slot. The carrier bolts onto the base through slots, allowing it to be moved. You determine *how far from the* blade you want the carrier by turning a bolt which threads through a T–nut in the base. The bolt butts against the carrier, and when the bolts that secure the carrier *are released*, the adjustment bolt pushes it toward the blade. A spring keeps the carrier in constant contact with the bolt; when you retract it, the carrier also retracts.

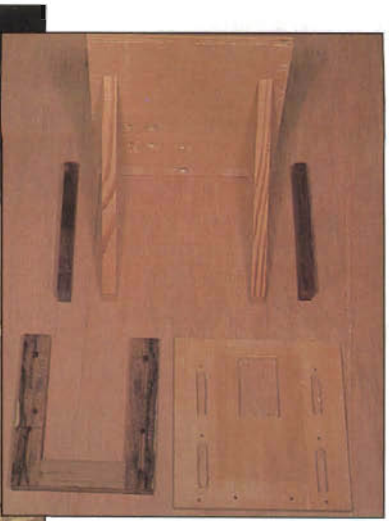
To keep the carrier face parallel to the blade, wooden ***ways*** butt up against the sides of the carrier. You fine tune them with bolts held by T–nuts so the carrier moves freely back and forth without slop.

Base Plate and Frame Pieces

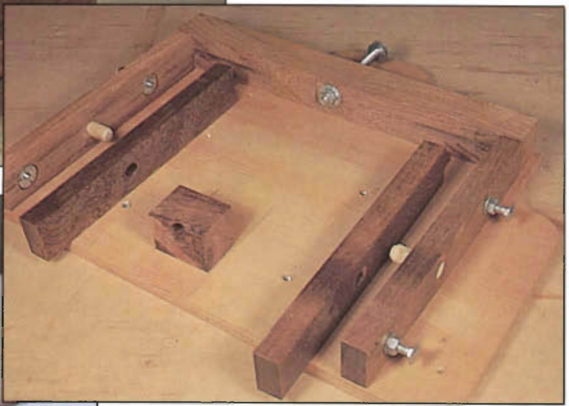
Transfer the full–size pattern for the base plates (A and B) from the PullOut™ Plans to ½" plywood. Also cut out the vertical and horizontal carrier plates (C and D). Make the rest from hardwood scraps. The bolts need something firm to contact, and hardwood ways will hold up best. Do not use oak—it's not very stable and will probably move, resulting in a curved way. Plywood is best for the wide pieces for the same reason. Wide hardwood pieces are fine, however, for the triangular supports (E) holding the carrier face because a lot of screws will go into their edges. Wood is most stable along

***Jeff Greef** works wood and writes wood–related journalism in Santa Cruz, California.*

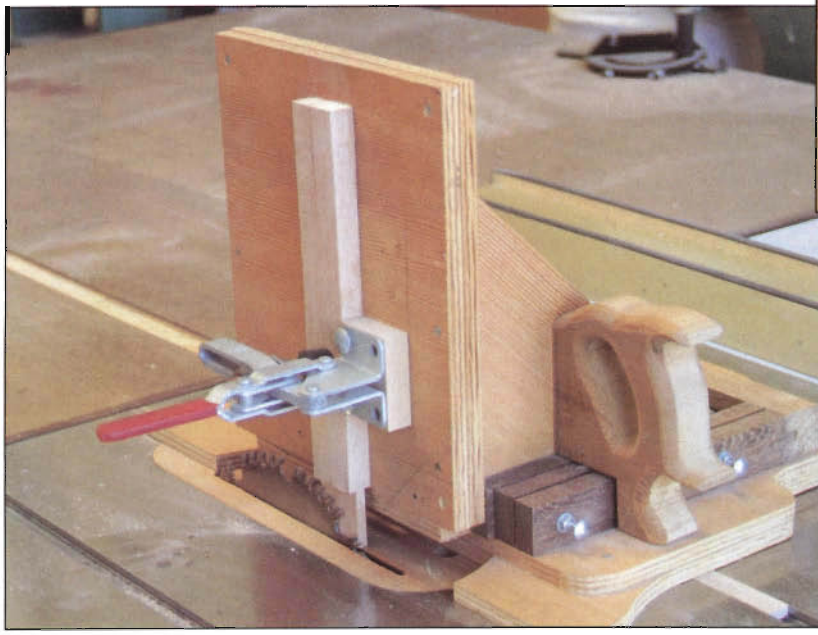




Cut the base and carrier plates from plywood. Use hardwood for the rest, including the triangular carrier supports.



After cutting tenons and drilling bolt and dowel holes in the base frame pieces, apply glue and clamp them together squarely. Then glue and screw the frame to the base.



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the grain, so to ensure that the vertical plate of the carrier stays at 90° to the horizontal plate, run the grain parallel to the ***hypotenuse*** (long side) of these triangular supports.

Both the carrier and base subassemblies include U–shaped hardwood frames. Cut the base (F and G) and the carrier frame pieces (H and I) as dimensioned in the Cutting List. While you're at it, cut the base ways (J), carrier ways (K), and the spring block (L)—all parts you'll need coming up. The frame pieces are joined with tenons in slots as shown in the Figures here and on page 29. To make the tenons you need to make your tenoning jig, set the length of the tenon as the distance from the fence to the outer edge of the blade, and the thickness by the blade height. Multiple passes across each side of the tenon eliminate the waste. Make the slots in the base frame end (F) long enough to accept both the side piece (G) tenon and the base way (J) tenon, as shown in the Figures. Check the fit, but don't glue up the frames yet.

Assemble The Base Frame

Inside the base U–frame on either side of the carrier are two base ways (J) which push against the carrier ways (K). The base ways are not secured to anything because they must move. They're held in place by short lengths of ½" diameter dowel (M) fixed in the frame sides (G). The dowel extends to fit into a hole in the way (see the Figures and photo above). Drill the side pieces and glue in the dowels. Drill the hole in the way a bit larger, or trim the dowel end so the way moves freely on it.

Now drill holes in the base frame sides and end for five T–nuts. They hold the ¼" X 4" main adjusting bolt and the four ¼" X 1½" bolts that fine tune the ways and keep the carrier face parallel to the blade. The ¼" T–nuts *I used require* 5⁄16" holes. I countersunk their tops flush with the surface. Make the countersink with a bit whose diameter is the same size or larger than the diameter of the T–nut flange.

Once the T–nuts are installed, apply glue only in the ends of the slot in the base frame end piece (F), and clamp it to the side pieces (G). Be sure the subassembly is square. When dry, glue and screw the frame to the upper base plate (B).

Next, cut a tenon in each base way (J) that will fit into the same slot in the base frame end piece. Cut this tenon just slightly thinner than the frame side piece tenon so the base way is free to move in the slot.

Build The Carrier

The carrier U–frame has four slots—two through each carrier frame side piece (H)—to receive the bolts that secure the carrier to the base. Make these slots by drilling a series of holes and then clearing the waste between the holes with a chisel. The slots need to be significantly wider than the thickness of the bolts that pass through them because the carrier must be able to move fore and aft a certain amount when you adjust the ways. I used ¼" bolts and made the slots just over ⁵⁄₁₆" wide. Large fender washers atop the slots guarantee that the bolt heads won't crush the slot edges. You also need to cut these slots and the rectangular hole for the spring block (L) in the carrier bottom (D) as shown in the Figure. Hold off on gluing up this U–frame a bit longer.

Advanced Tenoning Jig

Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
1	A	½"	16"	20"	lower base plate
1	B	½"	14"	17½"	upper base plate
2	C	½"	10¼"	12"	carrier plates
1	D	½"	8½"	9"	carrier bottom
2	E	¾"	8½"	9"	triangular supports
1	F	1½"	1½"	13½"	base frame end
2	G	¾"	1½"	10"	base frame sides
2	H	¾"	1½"	8½"	carrier frame sides
1	I	¾"	1½"	5¼"	carrier frame end
2	J	¾"	1½"	10"	base ways
2	K	¾"	1½"	8½"	carrier ways
1	L	2"	2"	2"	spring block
2	M	½" dia.		1¼"	dowels
1	N	½" dia.		8"	dowel
1	O	1½"	6"	6"	handle
1	P	size to fit		24"	table slot guide

Supplies

9	¼" T–nuts
4	¼" X 1½" bolts with nuts
4	¼" X 2" bolts with fender washers
1	¼" X 4" bolt with nut
1	⁹⁄₁₆" or greater dia. spring, length to fit
1	lever clamp

Make the spring block and drill a hole in it large enough for a ¾" diameter dowel (N) to pass through loosely. This dowel holds the retraction spring in line so it won't fly off. Fitting the dowel can be a bit tricky—you don't want it to rub against the spring block and interfere with the travel of the carrier. To avoid this, make the hole in the spring block ¹⁄₁₆" or more larger than the diameter of the dowel, but don't make it larger than the diameter of the spring or the spring will slip into the hole. Exactly how high above the base plate the spring block hole should be depends on the thickness of the carrier bottom (D), because the hole and the dowel that goes through it must clear it. I used ½" plywood; if you use a different thickness, adjust the hole height accordingly. Glue and screw the spring block onto the jig base so it protrudes through the hole in the carrier bottom (D).

One end of the dowel fits into a ½" deep hole drilled in the carrier frame end piece (I), and the other into a similar hole in the vertical carrier plate (C) as shown in the Figures. Drill the hole for the dowel through the *inner* vertical plate only, so that when the outer plate is screwed down, it holds the dowel in place. The fit should be snug, but don't glue the dowel in place yet.

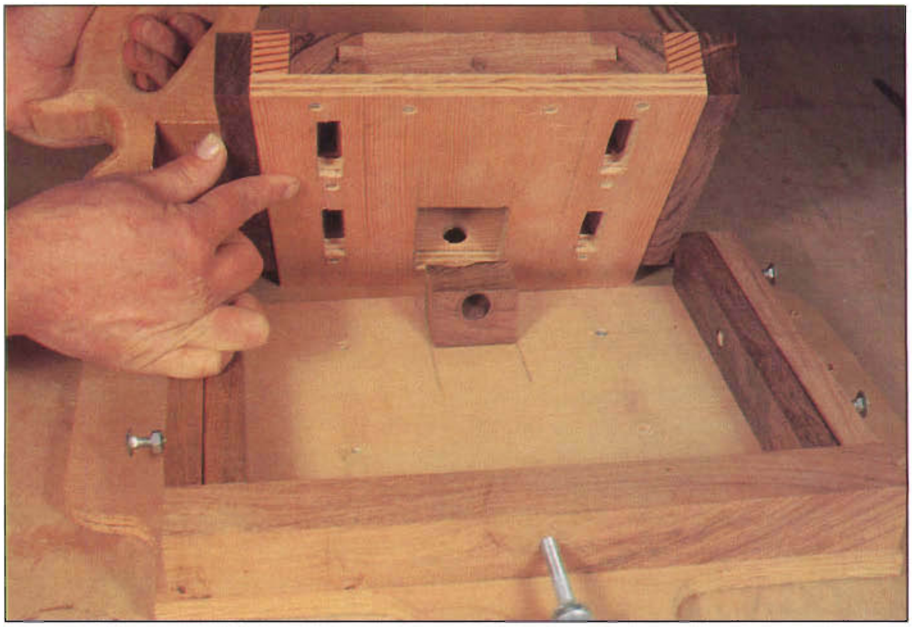
Once you've drilled the ½" deep hole for the dowel in the end piece (I), you're ready to glue and clamp all three carrier frame pieces together. Again, make sure they go together squarely. When the frame is dry, assemble the carrier—vertical and horizontal plates, triangular supports, and the U–frame—with glue and screws as shown in the Figures. Don't attach the outer vertical carrier plate to the assembly yet, or you won't be able to add the dowel and retractor spring.

Assemble The Jig

Place the carrier on the base so the spring block protrudes (*see the photo below*) and move the carrier to its fully retracted position. Feed the dowel through the hole in the inner vertical plate and pass it through the spring block about 1". Put the spring onto the end of the dowel (photo above right) and push the dowel farther, gradually working the spring onto the dowel. Once it's in place and you've wiped a little glue in the hole in the carrier frame end piece, tap the dowel home and attach the outer vertical plate to the inner one.

Make the handle (O) by tracing the pattern from a handsaw handle onto a thick chunk of wood and bandsaw it out.

Once you've completed the carrier and the base, put them together and move the carrier to its fully retracted position.



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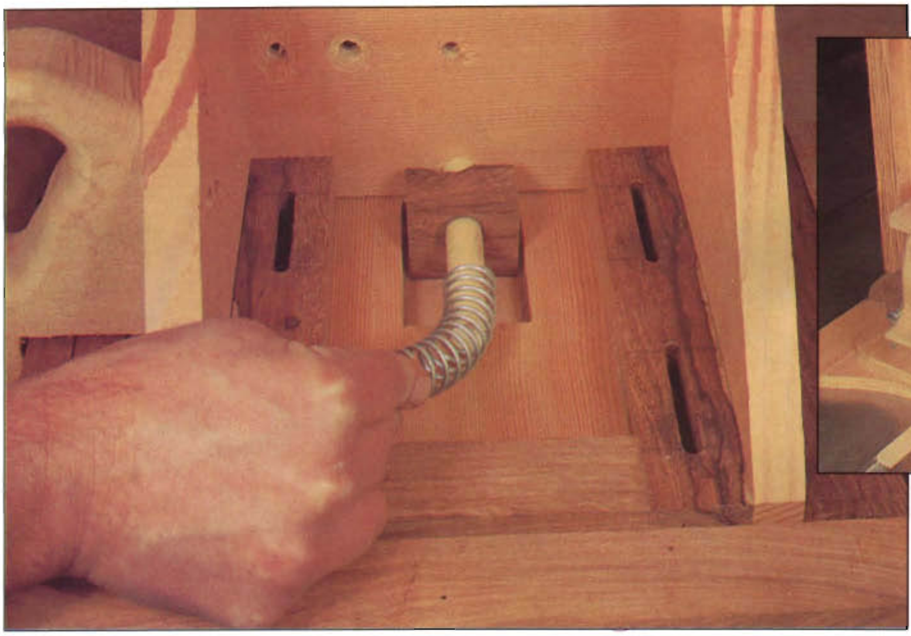
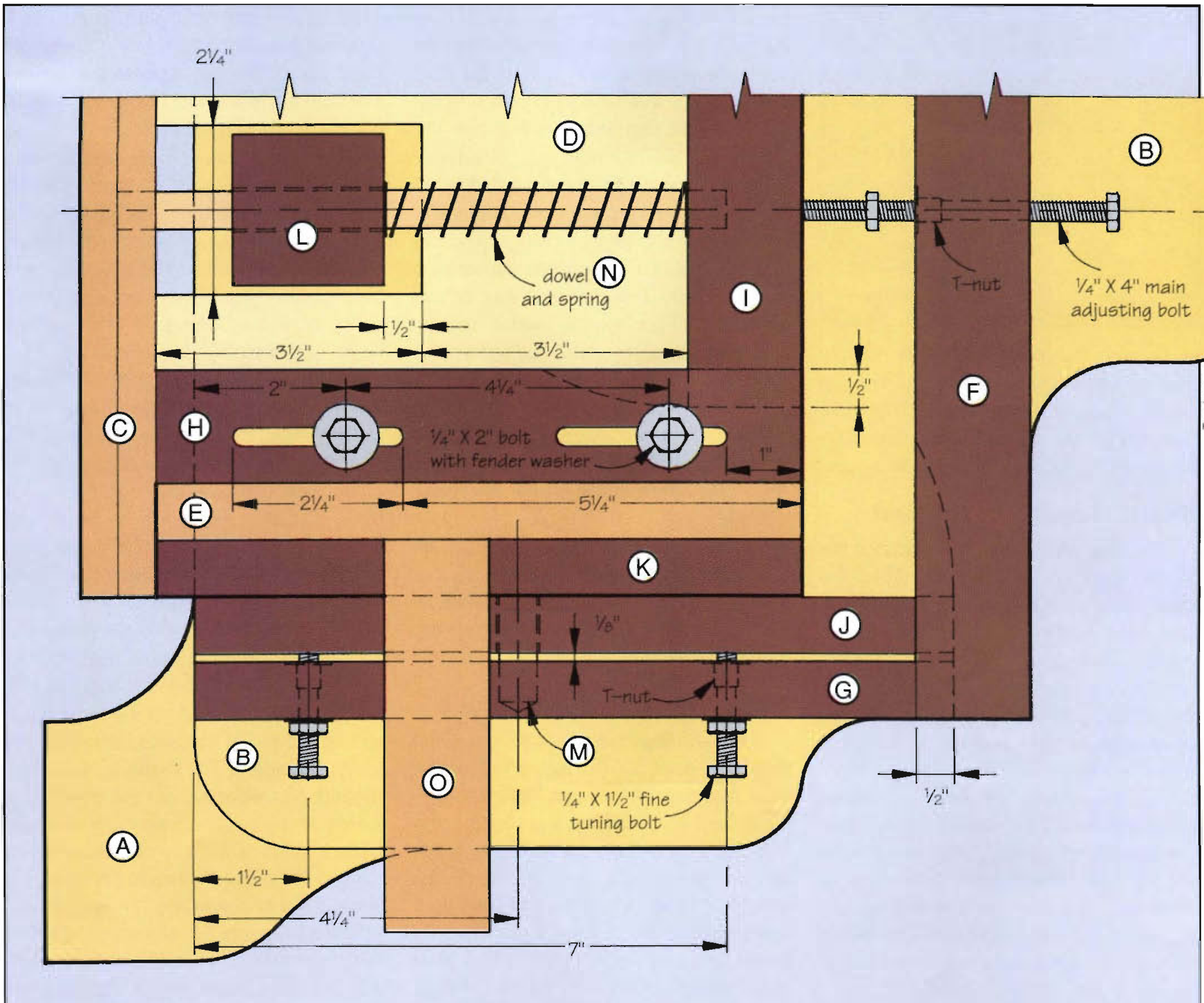
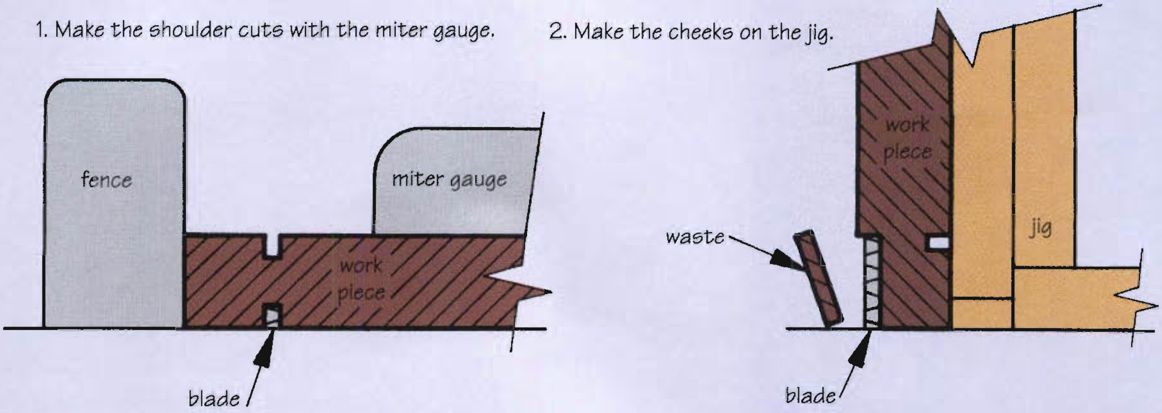


Insert the dowel into the hole in the vertical carrier plate and pass it through the spring block about 1". Put the spring on the end of the dowel and push the dowel along farther, gradually working the spring onto it.



Tenoning Jig Plan View

Two Steps In Making A Tenon With The Jig


1. Make the shoulder cuts with the miter gauge.

2. Make the cheeks on the jig.

author

Make sure the lower part of the handle clears the base frame and way. Since the handle is screwed to the carrier, it must be free to move with the carrier and cannot be attached to or rub against the base pieces.

Mount The Jig On The Saw

On either side of the carrier attach the carrier ways (K) which will contact the base ways (J). They must be parallel to each other, and the best way to guarantee that is to make certain the carrier sides are parallel when you build it. If the ways are not parallel, the result will be a wedging effect causing the carrier to bind against the base ways when it moves in one direction and loosen when it moves in the other. When you install the carrier ways, if you find they're not parallel, shim one side of one of them. Place tape, thin wood or cardboard between the way and carrier. The ways don't have to be exactly 90° to the vertical carrier face, but they must be parallel to each other.

Next, make a guide piece (P) to fit into the miter gauge slot in the saw table. This piece must slide freely in the slot but with no side–to–side slop. Any sideways movement will translate into inconsistent cuts, thwarting all your other efforts toward accuracy. Screw this piece to the bottom of the base, carefully locating it parallel to the carrier face and at such a distance from the face that, when the jig is placed in the guide slot, the carrier face is 1½" from the blade when the carrier is fully retracted.

Now place the jig in the slot, advance the carrier until it's close to the blade, and raise the blade as high as it will go. You can now see just how parallel the carrier face is to the blade. Use the base way adjustment bolts to position the carrier face exactly parallel to the blade, and tighten the locking nuts on each bolt. Test the carrier's movement back and forth along the ways; it should move freely with a little friction but not too much. Candle wax rubbed on the ways and between the carrier and base will help.

Once you've adjusted the carrier, mark the locations of the four ¼" X 2" bolts that secure it to the base, install ¼" T–nuts in the upper base plate (B), and bolt the carrier to it through the slots.

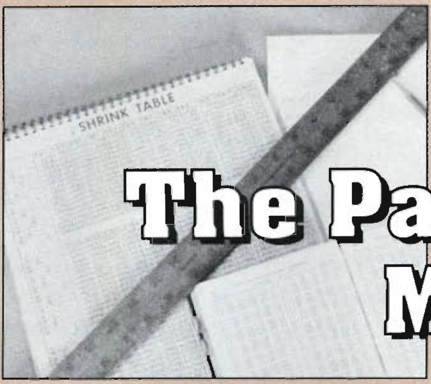
Using The Jig To Cut Tenons

A bolt–on lever clamp like the one in the photo on page 27 (available mail order from Woodworker's Supply, tel. 800-645-9292, item #173–003) guarantees that the workpieces are held consistently when you use the jig. You can hold the pieces with your hand, but be sure to keep your fingers well away from the blade. Whether or not you use such a clamp, you must install a vertical fence on the carrier face. This butts against the back side of the workpiece, holds it vertically, and prevents the blade from throwing it toward you. It also reduces tearout from the blade which happens at the rear of the cut as the blade breaks through. Make the vertical fence as thick as the part you plan to cut so it provides tearout backup along the whole thickness of the part. Locate the screws that hold the fence well above the area of cut so the blade doesn't hit them.

There are several procedures you can follow to make a tenon. You can establish the shoulder of the tenon before using the jig by making a cut with the miter gauge, holding the part flat on the saw table and butting its end against the fence as shown above left in the illustration. Then use the jig to establish the tenon cheeks. First clamp the part into the jig and advance the carrier toward the blade. Set the carrier to cut the cheek thicker than is needed; cut one side, then flip the part and cut the other. Now you have a tenon that is too thick; gradually adjust the carrier's position in small increments by turning the adjustment bolt just a little at a time, making test cuts with each adjustment until the resulting tenon is just the right thickness.

You don't need to make the shoulder cuts first—you can do them after the tenoning cuts or not at all. In the latter case, you let the top of the blade establish the tenon shoulders. The result will be a little ragged, partly because of the direction of the cut and partly because the top of most blades leaves a "V." You can avoid this by making the cuts with a dado set which will leave a flat shoulder, but the edges may still be a bit rough. For exposed shoulders that need to be clean, make shoulder cuts with the miter gauge. Use a backup piece attached to the miter gauge to control tearout at the back of the cut. PW

The Pattern Maker



by Jacob Schulzinger

With fewer and fewer patternmakers practicing their trade, it is important that we learn from them before their experience is lost. I visited two master patternmakers to discover what might be passed on to woodworkers. Much can be transmitted by the written word, but techniques must actually be practiced if they are to live on.

A. E. "Red" Shrum started back in 1939 as an apprentice with Todd Ship Yards and is now one of but a few "precision patternmakers" in the United States. A precision patternmaker regularly produces patterns to tolerances of +/-.005". Frank Schneider started as an apprentice in Omaha in 1937. During World War II he worked in the shipyards in Manitowoc, Wisconsin, where he made some of the 10,000 patterns that were needed for U. S. Navy submarines.

Red's shop is fairly typical of a patternmaker's shop and is a woodworker's dream. A 20" Oliver joiner, 24" Powermatic planer, 36" Crescent bandsaw with 23" under the guide, and a huge Oliver sliding bed gap lathe that can turn a 5–foot diameter piece of work are some of the larger fine machines in his shop. You might think that making precision patterns would be a snap, but not so. These tools make the job easier, but it's the craftsman who makes precision parts—not machines.

"How can other woodworkers make their work more precise?" I asked Red. "Take pride. It's pride in our work that makes us do better than we think we can. And practice—it takes over five years to make a good patternmaker." Frank Schneider's response was the same: "It's the pride you get when you turn a drawing into a layout and the layout into a completed pattern. It's in the total responsibility you take when you make something all by yourself and then see it work."

When I told Red I wanted to tell woodworkers about patternmaking, he replied, "I can't do that type of work. Those fellows perform miracles with their fingers. The finishing, the scraping and polishing, make the work absolutely beautiful. I can't make joints like they do. I've had guys come in here when they see my machines to have their stock planed—that's a pretty big planer over there—and some of them come back to show what they did with the wood. Beautiful work. Furnituremaking is a lot different from the work I do. They can build a piece that is $\frac{1}{8}$" larger than the plans call for and it looks great. If I make a pattern .015" out of tolerance it will be rejected."

The man who was telling me he could never build a fine piece of furniture held some of the finest precision wood parts I'd ever seen. While his pieces may not be as shiny and smooth as your last project, they are much more precise.

What makes patternmaking so different? It's the joinery, or lack of it. A pattern is designed to take lots of pounding. Pneumatic tampers are used to compress the sand, and when the sand is properly cured, the pattern is turned upside down and the molded sand removed. The newer sands cure in the pattern instead of being baked, and take a bit of jarring to break loose. Patterns are built up in layers for strength. At one time, patternmakers used Baltic birch plywood, mahogany, and sugar pine, but the high cost of pine has forced them to drop that material. The built–up layers are glued in position using the same glues woodworkers use, but instead of applying it to both surfaces, patternmakers put it on one and "wring" the two parts together to spread it evenly. Parts are held in place with clamp dogs and parallel or bar clamps, or they may be secured with

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Jacob Schulzinger *is an industrial engineer in the aerospace industry. Woodworking is his part-time business and hobby.*

small wire nails if it's an area that won't be worked on later. Because they don't use joints in their build–ups, they rely on flat surfaces and square edges for aligning the parts. This explains the need for cast iron assembly tables, and for the accurate jointing and planing machines in their shops.

What about hand tools? Red showed me his collection of old, quality planes, chisels and gouges. Some are real antiques. I could feel the gloss on some of the fine handles, a shine that comes only from half a century of careful use.

As I looked at some of the patterns Red showed me, I was amazed. The man who was telling me he could never build a fine piece of furniture held some of the finest precision wood parts I'd ever seen. While his pieces may not be as shiny and smooth as your last project, they are much more precise. I asked about the dull finish on his patterns. "If a pattern is too slick, it won't come out of the sand," he told me. "Old–timers used to keep some steel wool or sandpaper in their pockets just to rough up a pattern they felt was too slick."

One piece in particular convinced me that Red was being overly modest. Here was a partially completed pattern handcarved *to within* .010". How does he do it? With templates and razor–sharp tools. To make a template, he first makes a full–size layout from the drawing on a piece of ¼" painted Masonite. The layout is marked off in a fine grid pattern from a pair of baselines. From the dimensions taken at each grid location, a Masonite template is carefully laid out using precision measuring instruments (patternmakers use metalworkers' instruments like vernier calipers, micrometers and height gauges.) The templates are then hand finished to precisely the right dimensions, working only one surface at a time, and the grid locations marked for reference.

Then the delicate task of cutting the wood to match the templates begins. The templates are "crayoned" and pressed against the pattern. Any marks left indicate high spots in the pattern that must be worked down. The material is worked slowly with gouges until the impression that appears on the part matches the full outline of the template. Because they work in thousandths of an inch, cuts must be precise—there must be no mistakes. Even though the patternmaker can use a polyester putty for hiding dowel pin holes or screws, it's a source of pride that putty is rarely needed to correct an error.

To do this type of work patternmakers rely on razor–sharp tools. "Sharp enough to shave with," said Red. I watched as he quickly ran his knife blade on a grinding wheel and then proceeded to polish it on a buffing wheel charged with black rouge. The whole process took less than a minute. "All I do is get the cutting edge sharp by taking off the feather edge. The rest of the ground area doesn't matter." I tried the blade and found that despite his unorthodox method of sharpening, it could indeed shave me with no trouble.

"I haven't used a stone on my blades for over 30 years." He sharpens plane irons and gouges the same way. "With plane irons, I round the face to keep the corners from digging into the work, hollow grind the edge, and then polish it to get good chip flow. After that I polish the back of the iron to take off the feather edge. The gouges are polished the same general way. I always make sure the parts of the tool that the wood must flow over or that rub against it are slick."

Frank Schneider sharpens his blades differently. As he explained it, "When I first started in the trade, our patterns were made of hard maple and our tools had to be sharpened frequently. We used maple because the sand used as molds for pouring the metals had to be rammed in place. Today's air–dry sands aren't as tough on the patterns. The sand mixture is like a syrup poured into place and then pressed in by hand." Frank sharpens his bench knives on a disc sander and then dresses up the edges on a Washita stone. Chisels and plane irons are slightly hollow ground on an emery wheel, then stoned and polished on a buffing wheel charged with red rouge. Gouges take a bit more time but are worked on a cone wheel and then slipstoned for final finish.

Most woodworkers who have tried their hand at carving know that to make the job easier and cleaner you cut with the grain. When I mentioned this to Red he just smiled. "In this type of work, you go with what you have. There are times when you can't pick the way you want to work; the shape determines that. When you go against the grain you have to take very light cuts with the sharpest of tools."

What does Red recommend in the way of plane irons, gouges and chisels? "Don't play with toys. Buy the best tools that you can afford. And the best way to keep from getting hurt is to keep all of your tools sharp." This is a rule he has always followed—and he still has all ten fingers.

"Patternmaking is an art. You have to be able to visualize

Working on a patternmaker's table, Red Shrum checks a precision pattern for dimensional accuracy before sending it to the foundry.

After the first piece is cast at the foundry, Red carefully checks it against his pattern and plans.

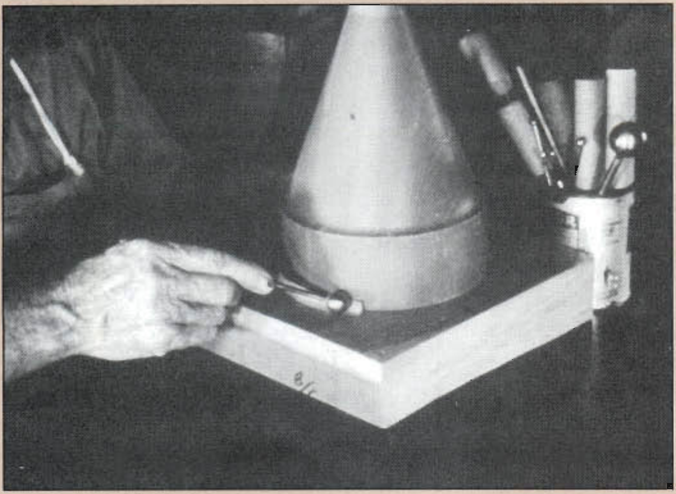
things in three dimensions. Lots of times you have to put yourself on the inside of a part and look out, like when you're making a core." Not a bad idea for cabinetmaking—imagine being inside, seeing the clearances needed, the way the drawers clear an open door, the way each piece interacts with its neighbor.

Both patternmakers and cabinetmakers use a variety of materials. Woodworkers have inlaid materials like ivory and leather into their creations for centuries. Patternmakers use leather for fillets and have developed their own techniques. The leather is first cleaned and softened with alcohol. Standard woodworking glue is applied while the alcohol is still damp. The reaction of the two materials makes the glue turn into something like contact cement. After applying the leather fillet, the patternmaker wipes off excess glue with a dry rag or one damp with alcohol. For thicker pieces of leather the material may be soaked in alcohol to make it more pliable. To produce the concave surface of the fillet, he uses a "fillet ball" to mold the leather. This is a steel ball of the proper diameter attached to a handle that forms the correct radius. For the home shop, a marble or ball bearing could be epoxied to a convenient handle to serve the same purpose.

> **"Patternmaking is an art. You have to be able to visualize things in three dimensions. Lots of times you have to put yourself on the inside of a part and look out..."**

Patternmakers work with a variety of tools used in other crafts, adapting them to their own needs. A metalworking milling machine or drill press equipped with a two–axis indexing vise takes care of many precision locating requirements. There are times, however, when a rotary indexing table attached to a milling machine is necessary—when, for example, a series of holes must be drilled in a circular pattern or a spiral form is needed. Boring and counterboring close–tolerance holes is simplified by the use of standard milling machine–type boring bars whose cutters have been reground for optimum use on wood. Metal milling machines are also useful when a series of accurately located serrations must be produced. The index teeth for an outdoor flood lamp is a good example. The patternmaker first grinds a milling cutter to get the correct tooth profile and then uses a rotary index table to produce the desired effect. Before milling machines, this type of work was laid out by hand and each tooth handcarved.

Note the leather fillet at the base of this pattern. A steel fillet ball forms the leather into the required shape.



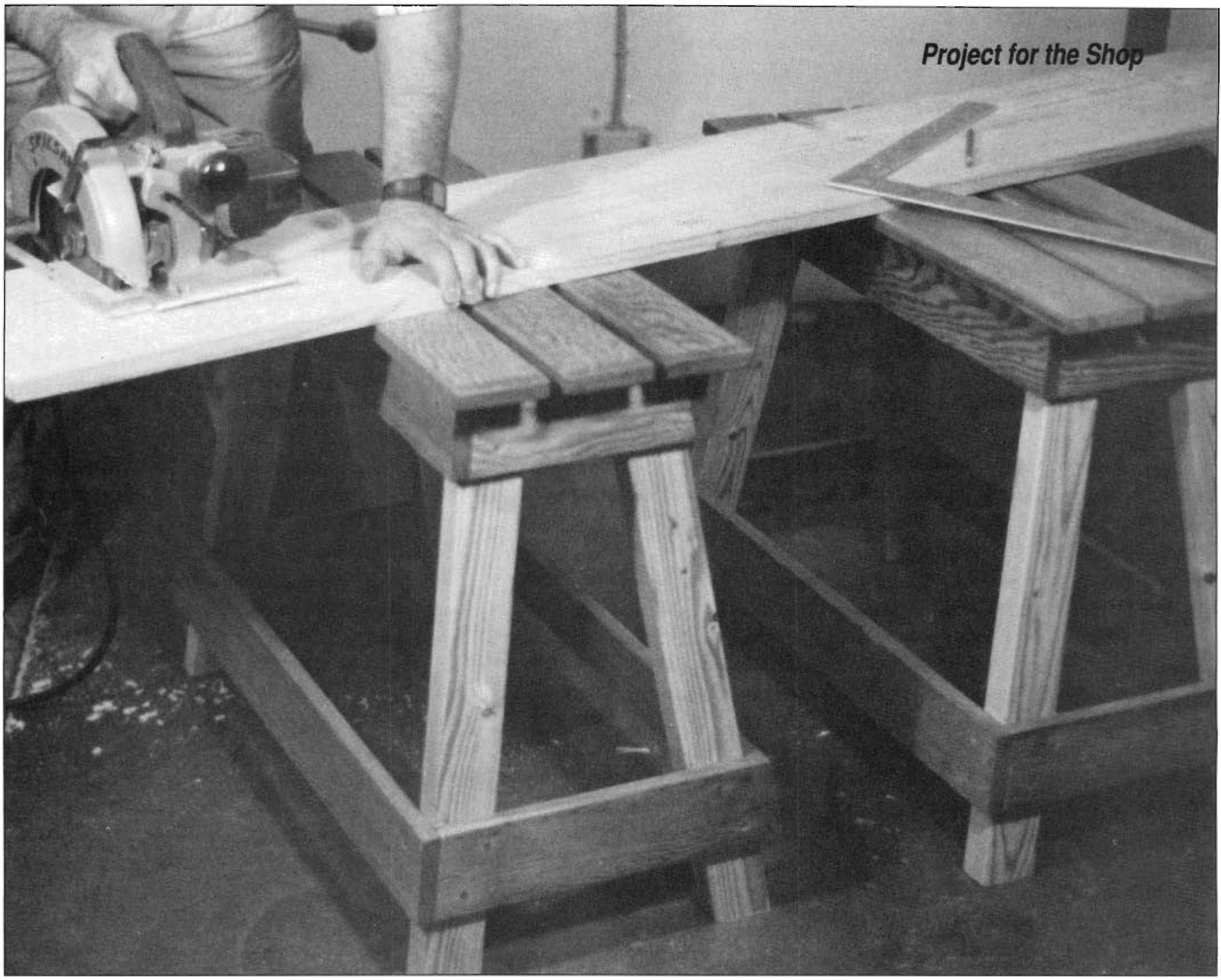
Because of the nature of the materials and the close tolerances required, lathe turning tools must be at their sharpest. Often many cylindrical parts will be split later, so the rough blank halves are aligned with dowels and screwed together at the waste ends. After the patternmaker completes the last "in the round" operation, he removes the screws and cuts off the waste. Frank Schneider told us that he cuts only when working with a gouge because he finds scraping more accurate. For very precise work he'll use a metalworking lathe, and his turning tools are like those used in metalworking except they're ground specifically for use on wood.

"A good patternmaker knows his math," said Red. "I can't rely on measuring angles with a protractor—that's not accurate enough. I have to be able to calculate exact dimensions for my work." How complex can that be? "Take the coupling tongues on a railroad freight car. When you make patterns for them you have to calculate the set–over dimension for each angle and then use a shrink rule to get the exact value. Because of the way the metal in each area will contract when it cools, you may use four different shrink rules to make up one pattern." What is a "shrink rule?" It's a way of making an allowance in the pattern for the expansion and contraction of a material. They're special rules with this allowance built in. For example, a 5–16 shrink rule, which is nominally 1" long, will actually measure $1\frac{5}{16}$" and will be graduated in such a way that each 1" marking will actually be 1" plus $\frac{1}{12}$ of $\frac{5}{16}$" or 1.026". Because many measurements are made using vernier calipers or micrometers, special shrink rule tables covering a variety of conditions are available that eliminate the need for the actual rule. In Red's shop I counted no less than seven different 12" nominal rules for English, and eight for metric measurements.

What about benches and vises? The benches I saw were sturdily constructed though not as fancy as the maple benches you might find in a shop specializing in precision cabinetwork. But there were three cast iron patternmaker's tables, the likes of which I'd never seen. Each has a ground cast iron top with a reinforced base—and weighs a ton! The tops have 5" grid lines machined in them to make layout easier. When I asked if anything like this would help woodworkers, Red replied, "If I were making a bench for building furniture I would make the corners absolutely square. That way I could clamp a board on each of two edges and have a built–in square." Then there were the vises, not like those in a cabinetmaker's shop, but heavy, malleable iron vises that swivel, pivot, and flip upside down to get the work in just the right position for carving. "That Oliver is the best vise you can find," according to Red.

The patternmaker's shop is a cross between the machine shop and the woodworker's shop. He uses the tools of both trades with equal ease and skill, and understands how both metal and wood will handle and react to changes in composition, temperature and moisture. He uses wood, metal, fiberglass and plastics to produce the quality patterns, models and tracer molds demanded by industry.

With fifty years of patternmaking behind him, Red makes sure he doesn't get burned out. When I said I'd like to come back to take photos, he reminded me to call first because "I just might be out fishing." Red's love for wood*working shows in the* pride he takes in his work. He's equally proud of the work produced by the fifteen or so "really good" patternmakers he's trained. PW



Carol Law

Workhorses

by Don Kinnaman

Sawhorses usually work best in pairs, but the larger work surface of this sawhorse/bench design increases the versatility of the basic sawhorse. With this design they can still be used two at a time to support long materials, or they can be used one at a time as individual work surfaces. If you glue and screw all the joints, these real workhorses will last you a long time and be ready to use for a host of projects throughout the house.

Start by cutting four legs (A) for each bench. Set the miter gauge and the table saw blade at 80° (10° out of square) and trim one end of each leg. Then move the miter gauge to the other slot to trim the other end parallel at the finished length. Attach an extension and a stop to the miter gauge so all the legs come out the same.

With the blade still set at 10° out of square, rip the material for the end braces (B and C) and the side braces (D and E) to width. Then straighten the blade and use the miter gauge (still set at 80°) to cut these parts to finished length. The lengths given in the Cutting List are for the longest edges of these parts—from point to point.

Begin assembly by joining pairs of legs with one top end brace (B) and one bottom end brace (C) in modified "A" frame as-

Workhorses Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
4	A	1 1/2"	2 1/2"	24"	legs
2	B	3/4"	3 1/2"	9"	top end braces
2	C	3/4"	3 1/2"	14 1/8"	bottom end braces
2	D	3/4"	3 1/2"	26"	top side braces
2	E	3/4"	3 1/2"	30 1/8"	bottom side braces
3	F	3/4"	3 1/2"	30"	top slats

Don Kinnaman is a retired high school woodshop teacher from Phoenix, Arizona, and a frequent contributor to Popular Woodworking.

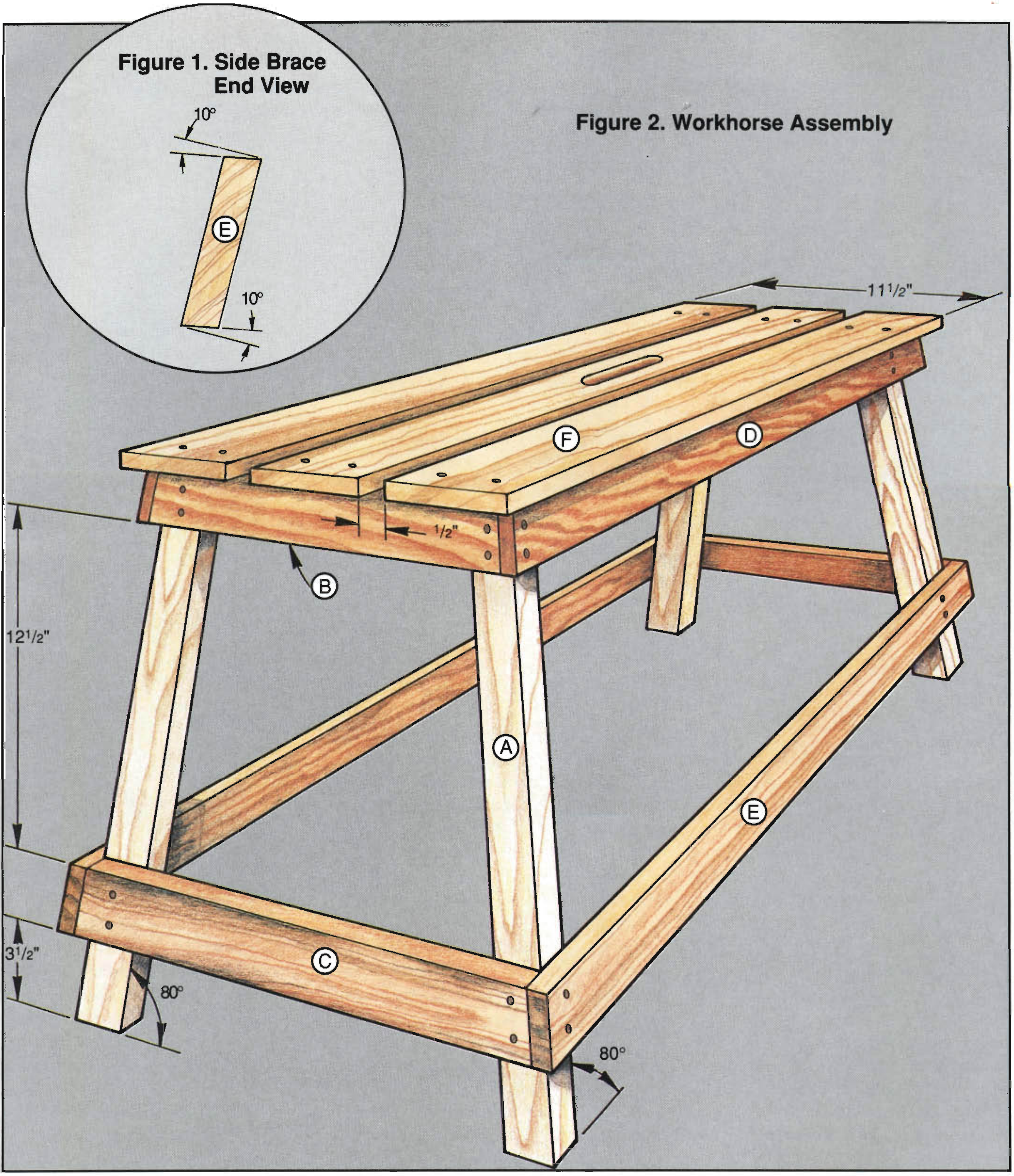


Figure 1. Side Brace End View

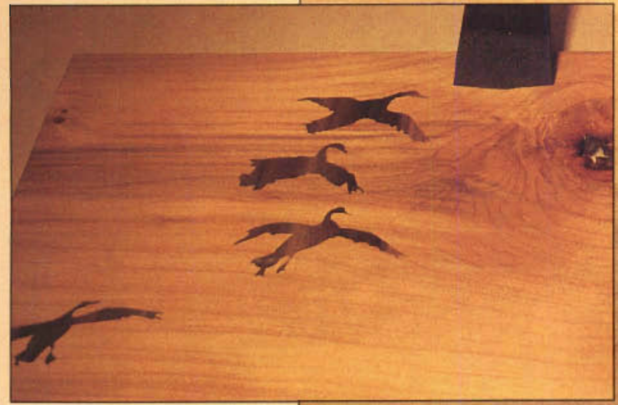
Figure 2. Workhorse Assembly

Bob Chapla

semblies. Glue and screw the top brace flush with the ends of the legs; attach the bottom brace so its ends are flush with the edges of the legs (see Figure 1). Then use the side braces to join two "A" frames together.

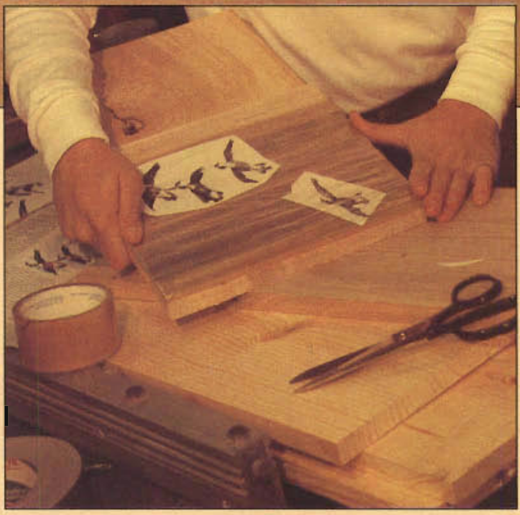
I used three slats on the top of the bench, but their width could be determined by what materials you might have around the shop. Cut the top slats (F) to size, and lay them out and attach them as you see in Figure 2. The hand carrying hole is optional, but I find it very handy. Locate the center of the middle slat and measure out 2 1/2" from the center towards each end. Drill a 1" hole at these two points and cut the middle part out with a saber saw. I used a 1/4" corner roundover router bit and a little sanding to round the top and bottom edges of the hand hold as well as the edges of the top slats.

You may want to leave your sawhorse–bench a natural wood color, paint it to match your equipment, or give it a clear coat finish. Whatever you may choose, you will end up with a real workhorse—one that will be a big help in the shop. PW



Scroll Sawn

INTARSIA



by Hugh Foster

Intarsia, like marquetry, is a type of inlay which involves setting pieces of wood, synthetic ivory, or the like, into a surface, usually at the same level, to form a design. Marquetry, nearly always done with veneers, is far better known. The purpose of this article is to introduce you to an art form that can readily be done with your scroll saw.

Steve Vorndran, midwest sales representative for Sakura USA, a leading scroll saw supplier, has become expert at scroll sawn intarsia. He starts his demonstrations by showing how to set up the scroll saw for maximum performance. It's essential that your scroll saw be set up properly to reduce or eliminate vibration: loosen the bolts in its stand, stick the stand to the floor with inverted loops of duct tape, run the saw for a second, and then retighten the stand. You'll find that the saw now runs much more smoothly.

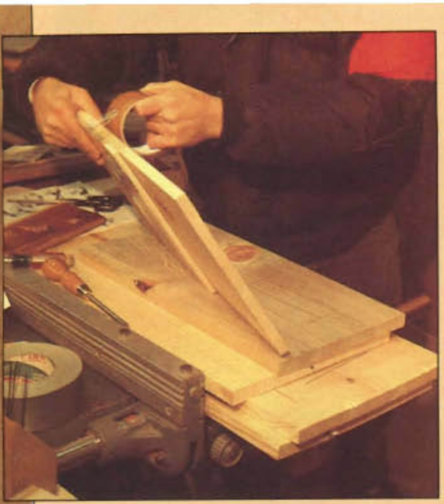
For this project we use ST-2 blades (20 teeth per inch) because their .029" width and .012" thickness permit tight radius work. As you're cutting you'll find that these thin blades sometimes stretch, so they must occasionally be re-tensioned. While in the demonstration, no single blade was ever broken, but Steve inserted a new blade every time he entered a new hole. At $20.50 per gross, the blades cost only a little over 14 cents each, so using a fresh blade often isn't likely to break you. Replacing the blades this regularly makes it less likely you'll break one and damage your work—or your hand—with that one stroke your saw can make before it comes to a stop. If you do break a blade, be sure you replace it with a blade of the same size. Changing the blade with each entry is far cheaper in the long run than dealing with the aggravation of breaking blades, says Steve.

The pattern used here came from the pages of a wildlife magazine. Steve rearranged the figures on the board in order to use as much of the design as possible. There's no need to look for fancy pattern books when you can get what you need from magazines, coloring books, even the daily newspaper. A reducing/enlarging photocopier will quickly bring the design to the right size for your work.

Choosing materials carefully is important. The more contrast apparent between the two woods, the better the results will normally be. Matching the colors, grain figures and patterns correctly is really the most difficult part of the project—after working through several projects, you'll find yourself developing an eye for the most artistic wood selections and combinations. "Artist? Shoot, I'm just cutting on a line," says Steve.

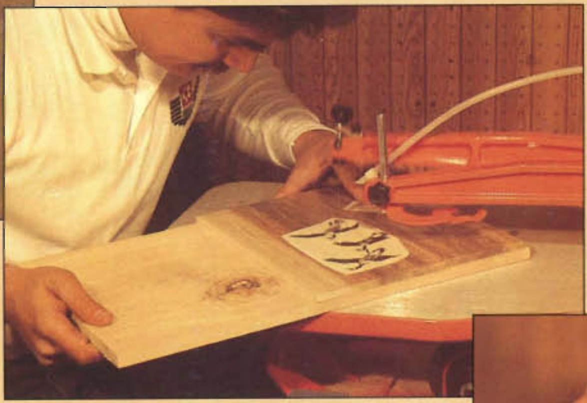
As with any new technique, after the first few practice projects, the work will be less difficult and the results more satisfactory. The project shown here involves only silhouettes, but many aesthetic factors come into play. The cutting is about as difficult, or at least time-consuming, as the layout and selection of materials.

***Hugh Foster** is a part-time furniture designer and builder in Manitowoc, Wisconsin, and the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*



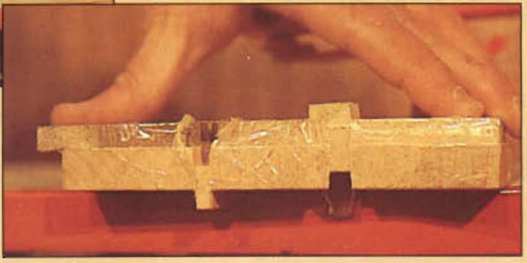
The two boards must be taped together tightly—the top board is entirely covered with clear packing tape. Drilling entry holes for the blade is most accurately done on a drill press.

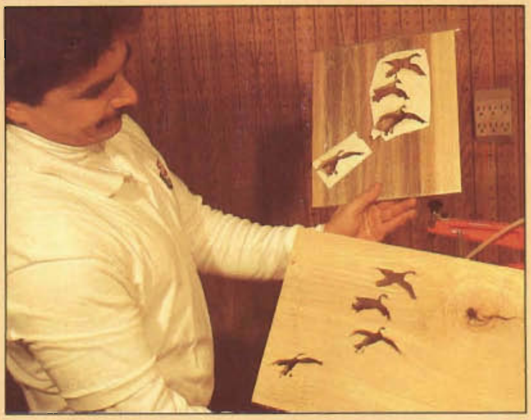
author



The workpiece will go through wide swings as you cut. In order for the cutout pieces to "fall" into place, the blade must be angled a few degrees away from the perpendicular. This means you must rotate the work so you're always cutting clockwise.

Make your first cuts on a test block. In the photo below left, note how the sample cutout on the left has just about fallen through; the piece to the right shows the correct fit.





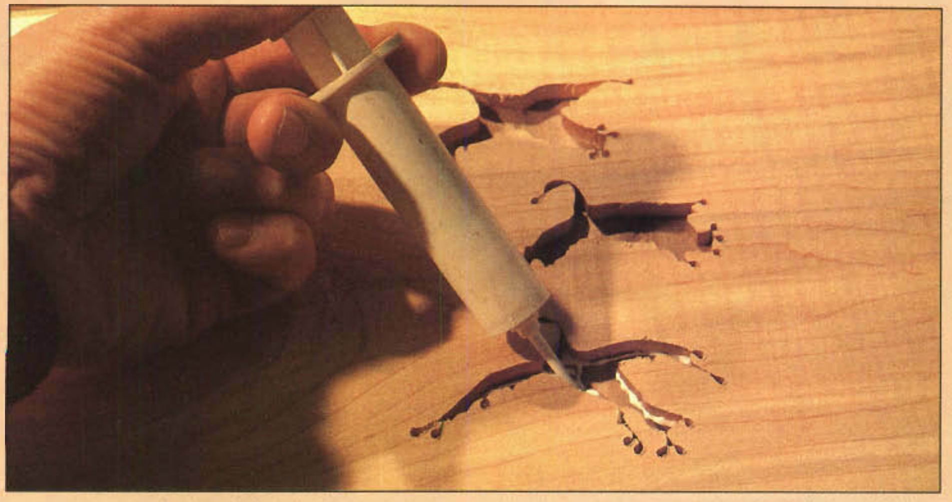
After all the pieces have been sawed out, cut and remove the tape. To the left, Steve Vorndran holds up the two boards. The upper one—which still has the pattern attached to its surface—provides the design pieces that will be inset in the cutouts in the lower board.

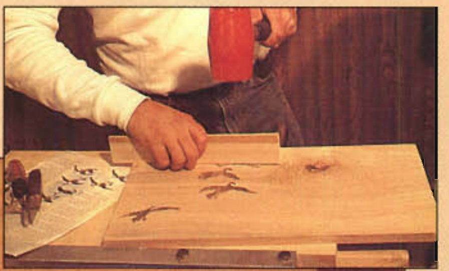
Tape the pattern on the board you've chosen with inexpensive packaging tape; then tape the boards together. Be sure to flatten the tape as much as possible—try rubbing the surface against the straight edge of a saw table. If the tape fails to hold and the boards slip even slightly, you'll probably have to start over. Also be certain that you are inlaying softer wood into harder wood rather than vice versa. In the project here, Steve is inlaying poplar into maple. As you become more proficient, you may inlay several woods and go through three or more tapings.

Before you start cutting, use scraps of the same woods you've selected as test pieces to set up the blade angle. If you're working with 5/16" stock, 3° will probably be right. On cast saws, the angle gauges are often not very reliable, so the test piece sets the angle of necessity. The test piece photo (above center) shows what happens when you have too much angle. The piece should just about fall into place.

When cutting, always cut from the same side. The table tilts from left to right, so all cuts must be from left to right (clockwise) or the bottom piece will fit into the top board instead of the top piece dropping into the bottom board. In the photo of the test cuts, note the angles. If you change direction while cutting, the pieces won't fall into place. It's always necessary to inlay the top piece into the bottom piece rather than vice versa. This point may appear to demonstrate an "amazing grasp of the obvious," but in practice you'll probably learn this only by cutting incorrectly on a board or two.

The real secret to sawing is learning to spin the work so that you're always cutting clockwise. Often you must back up and turn around to cut square corners. Take the time to think through what you're going to do before you do it.

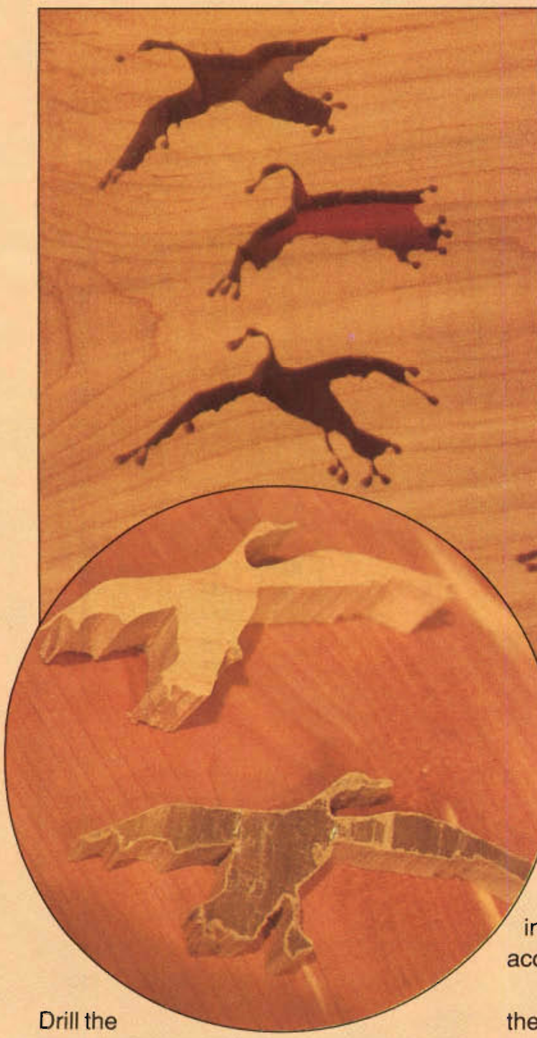




The pieces are set in their holes and tapped until they're about flush with the top surface of the background board. Protect them from the mallet with scrap.

author

The cutout pieces are of thinner stock, so they're recessed from the back surface of the board. Drill points and turn circles are clearly visible. An injector effectively applies the glue bead fixing the pieces in place. After puttying, a belt sander and fine grit paper readies the work for finishing.



Drill the entry holes at critical corners, using the smallest bit through whose hole you can feed the blade. Feeding the blade through the holes goes lots easier when you're working with a saw whose lower blade guide just locks in place. That way you can remove the blade and feed it through the hole out into better light than you might have under your saw's table.

The drilling is best done on a drill press unless you have real confidence in your ability to drill perpendicular holes accurately with a hand drill.

Sometimes it'a a good idea to tear off the pattern about 1/4" from the entry point to ensure entry and exit through the same hole. Making sure that the piece is absolutely removable is far more important than following the design down to the nearest micron.

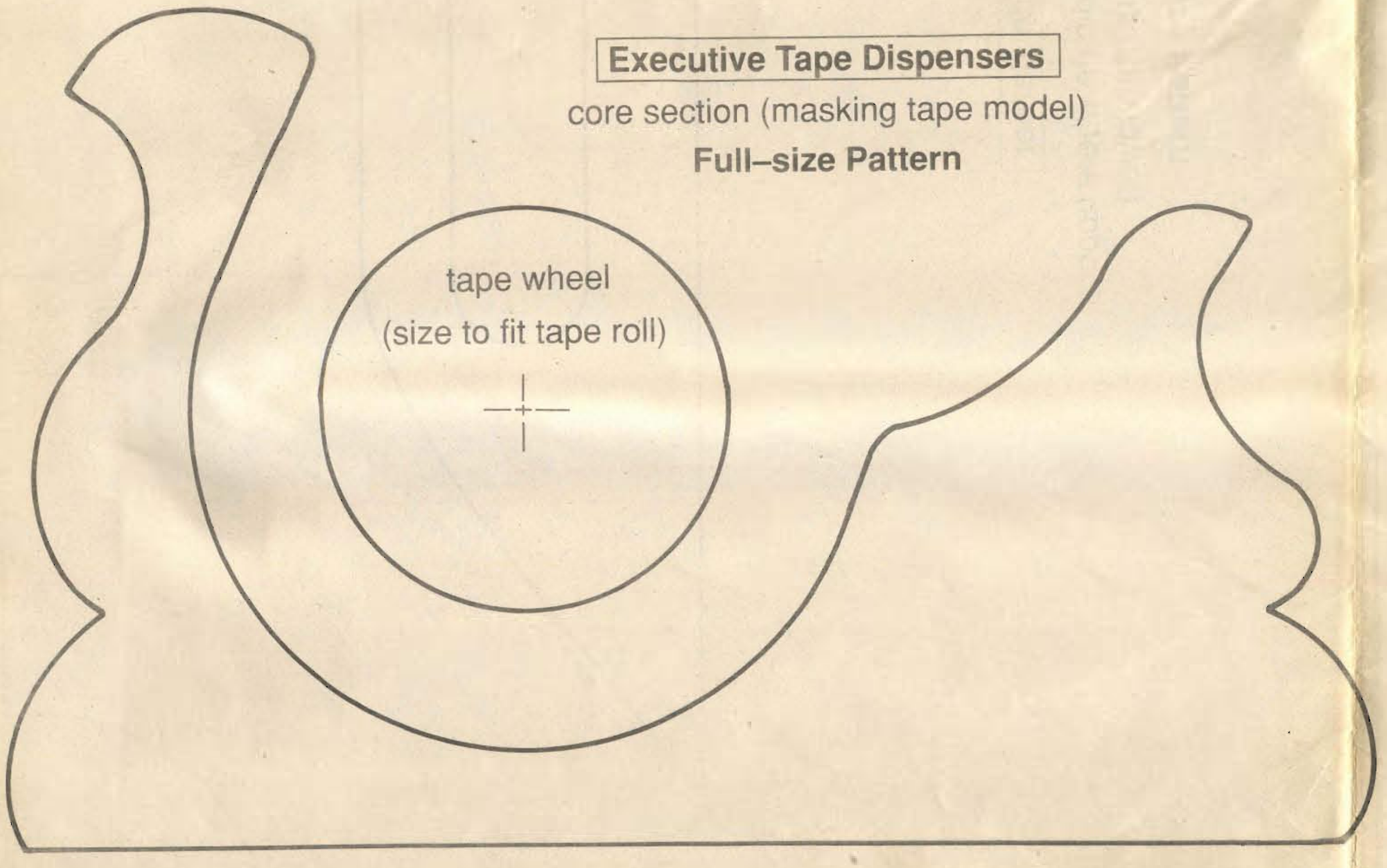
When you untape everything, you'll find that even the left-over portion of the top piece can be very handsome.

After the cutout pieces have been tapped into the background board, putty in the holes; this is a good place to use homemade filler made from scraps of the same wood (see *Popular Woodworking* #56, September 1990) or a commercial putty like Wood–Tex Synthetic Wood Filler (which comes in 26 wood colors).

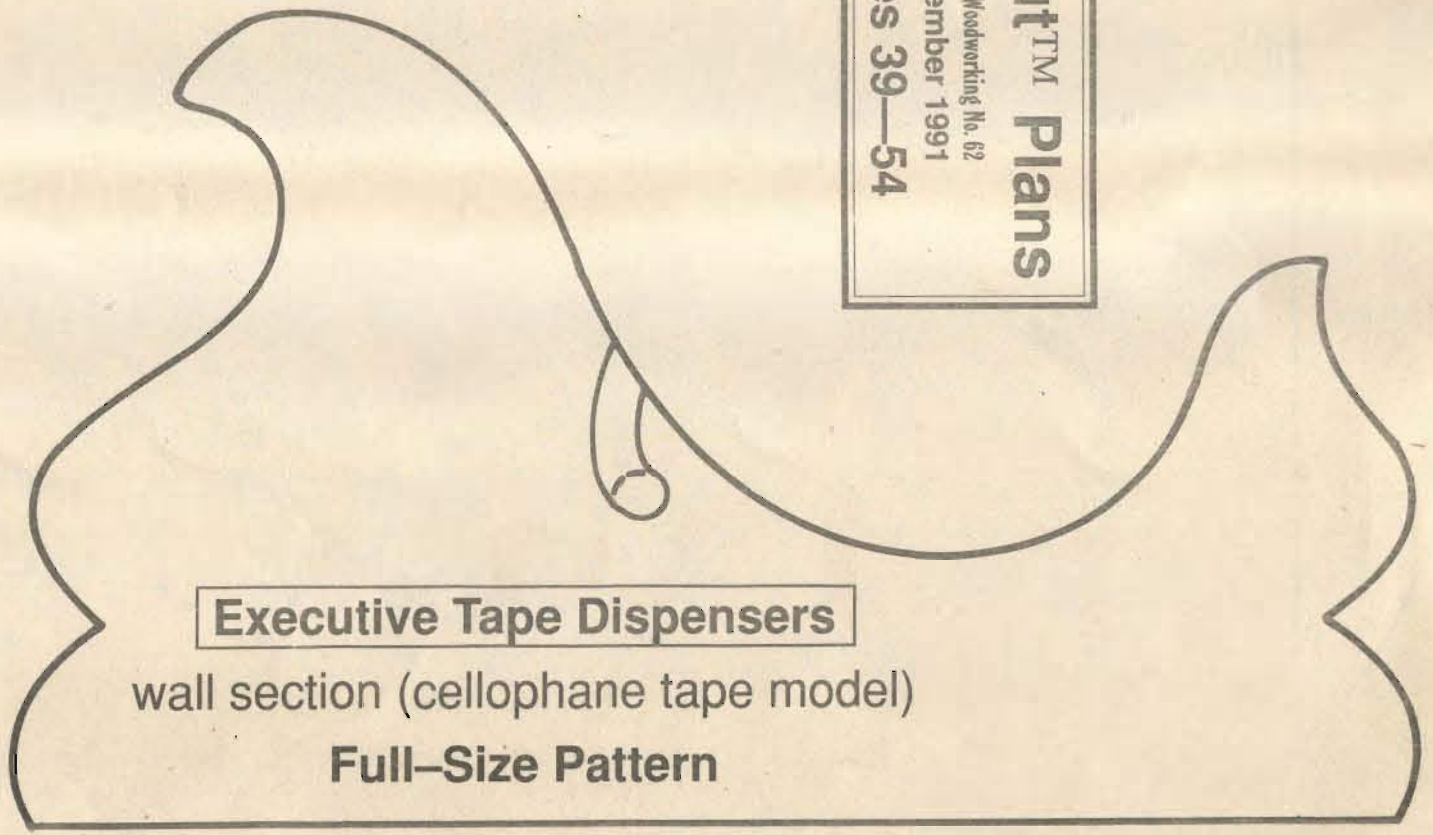
After the putty has set, sand the face. This is a good job for a fine cutting belt sander or one of the new random orbit sanders. Glue applied on the back side of the project helps to hold the pieces in place. Complete the piece with a clear finish, and you're ready to wax it.

As you become a more proficient scroll sawyer, you'll turn your creations into finished products faster, and you might think about marketing them. Wildlife scenes like this one are especially popular items at craft and art shows. **PW**

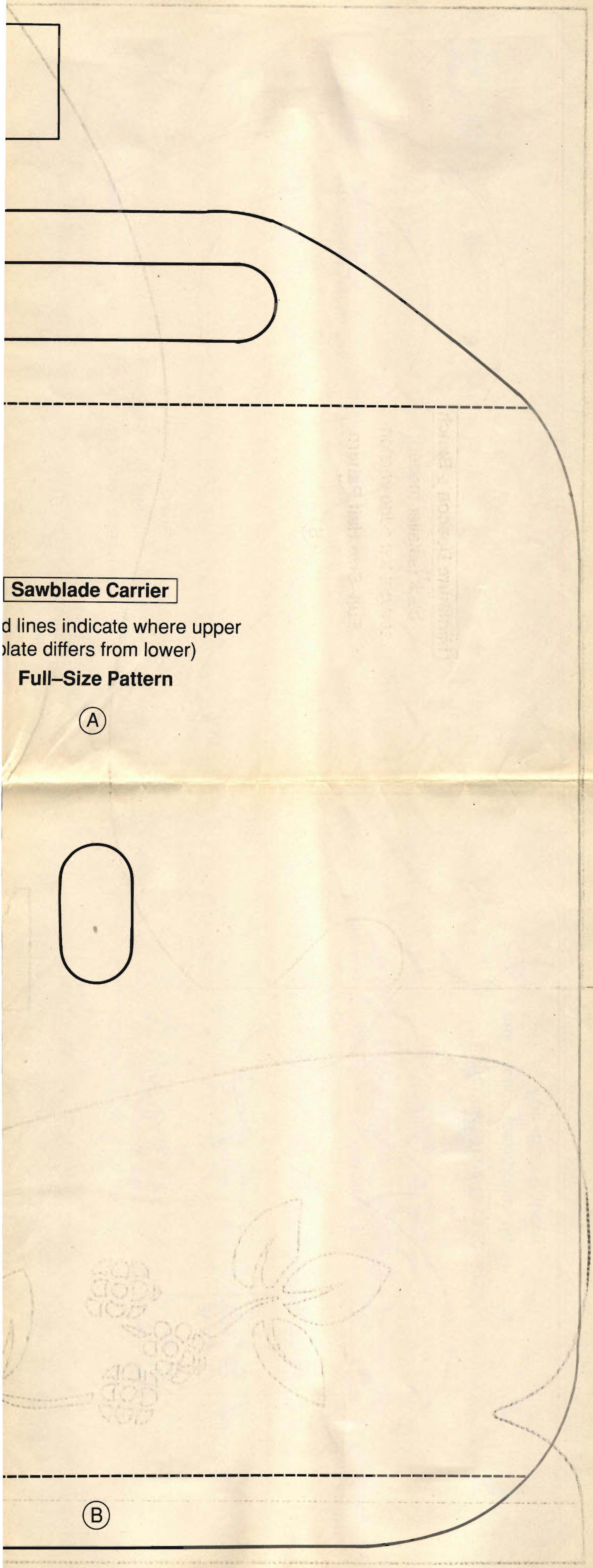
PullOut™ Plans
Popular Woodworking No. 62
September 1991
Pages 39—54



Executive Tape Dispensers
core section (masking tape model)
Full–size Pattern



Executive Tape Dispensers
wall section (cellophane tape model)
Full–Size Pattern


Sawblade Carrier
d lines indicate where upper
late differs from lower)
Full–Size Pattern
Ⓐ
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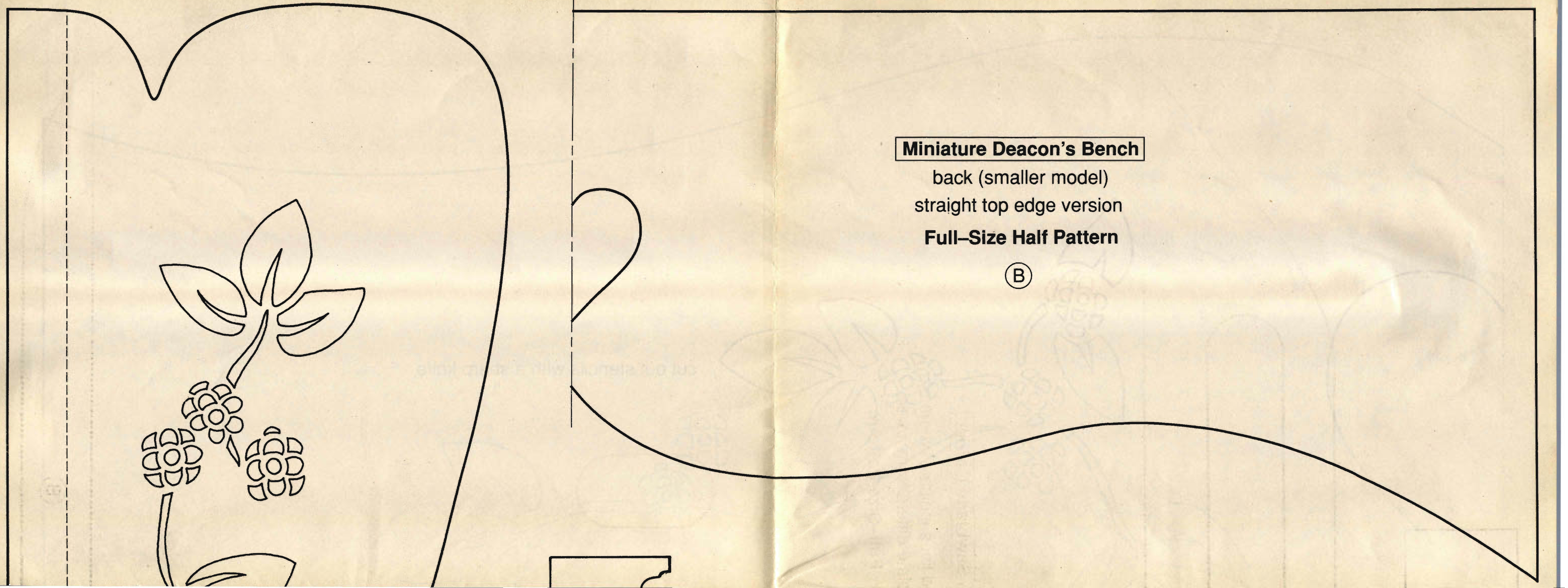


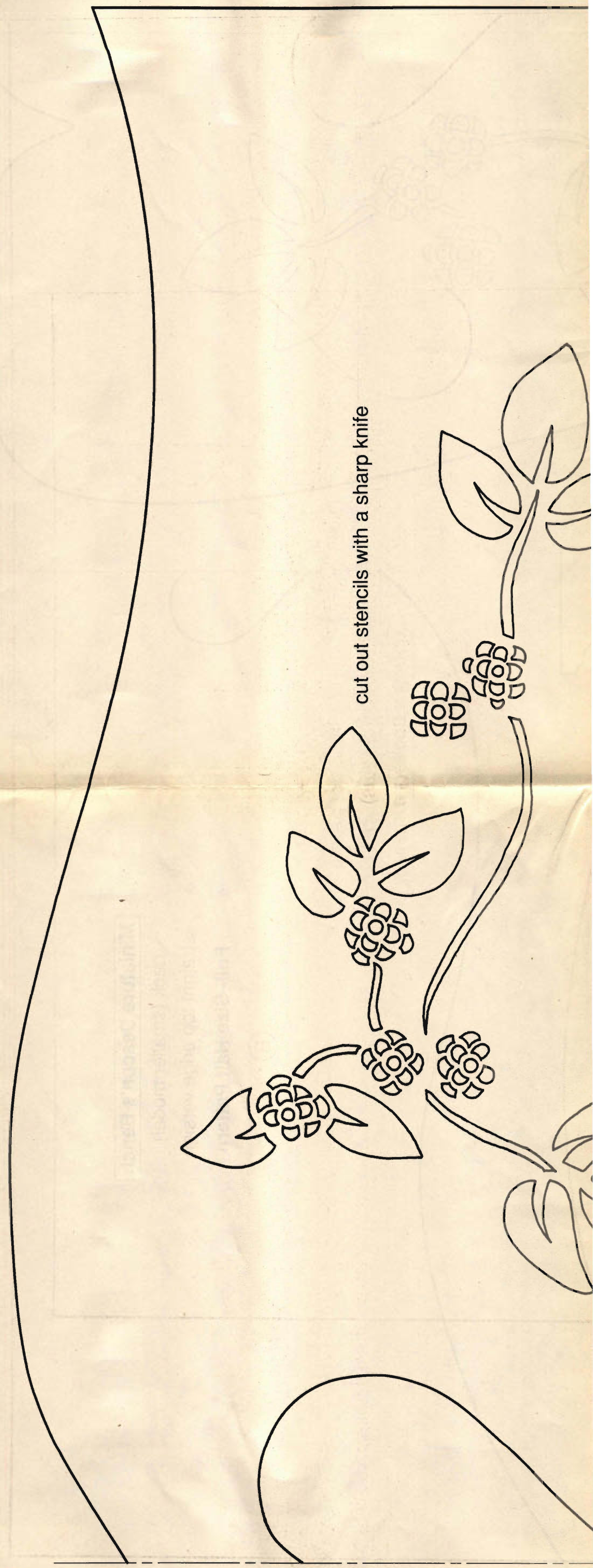
Miniature Deacon's Bench

back (smaller model)

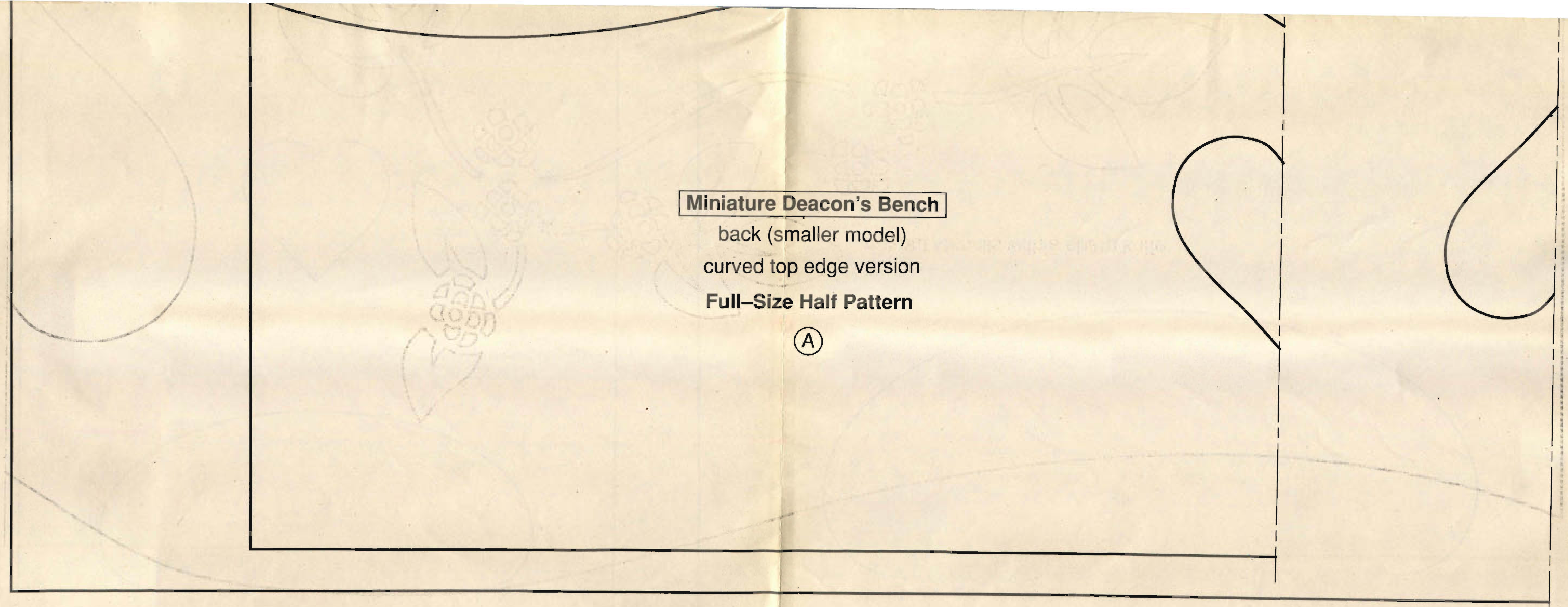
straight top edge version

Full–Size Half Pattern

Ⓑ



cut out stencils with a sharp knife



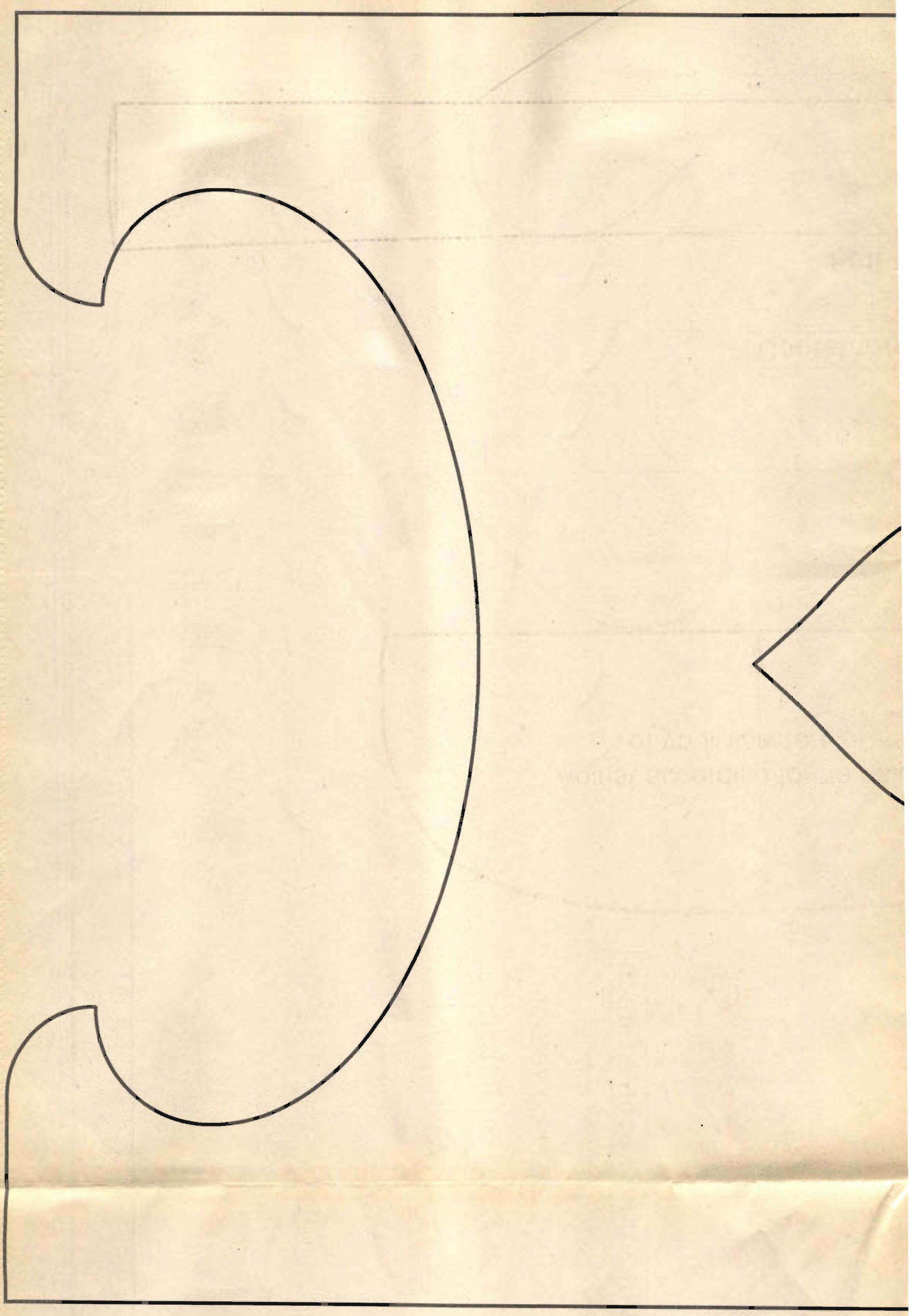
Miniature Deacon's Bench

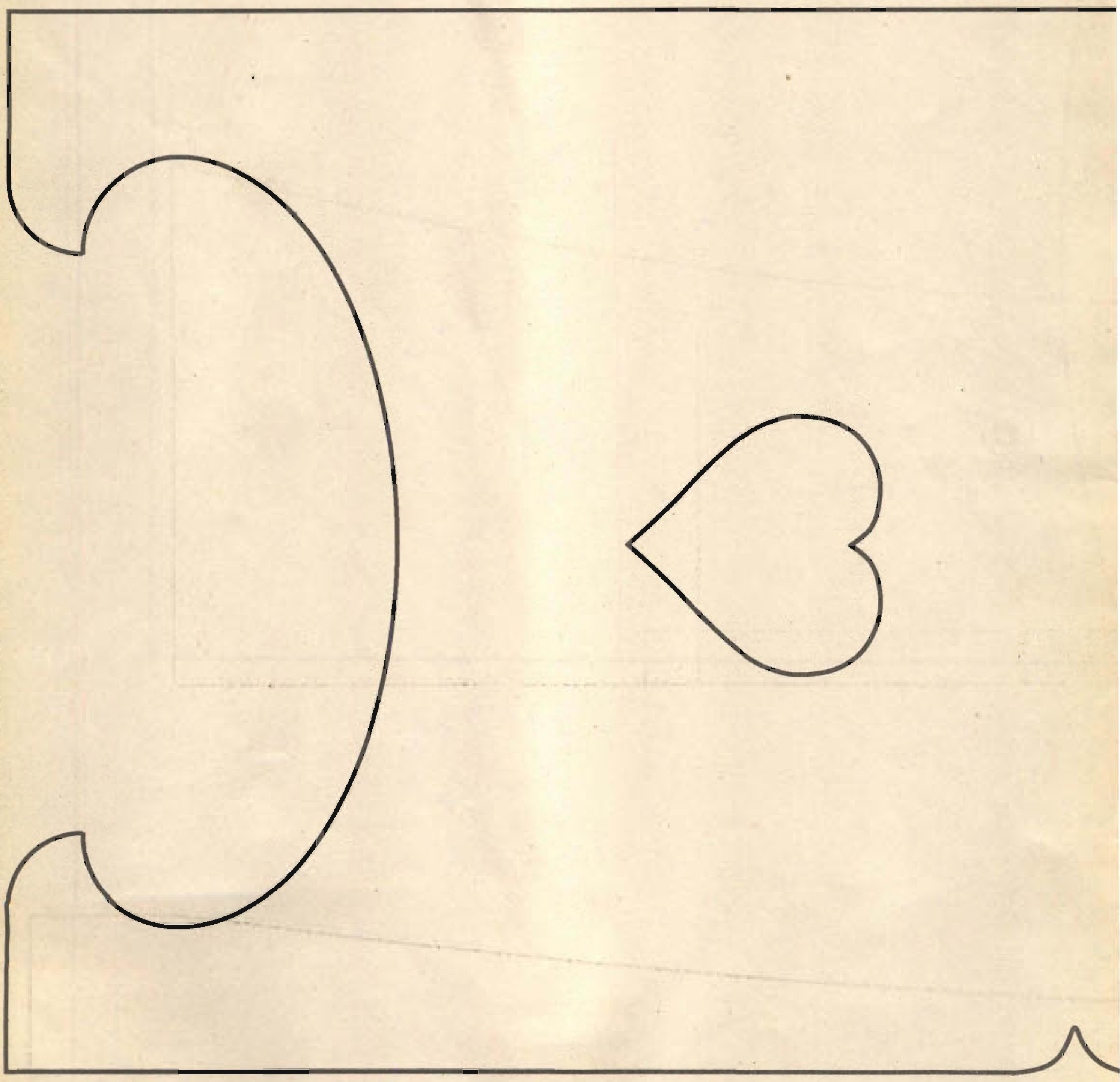
back (smaller model)

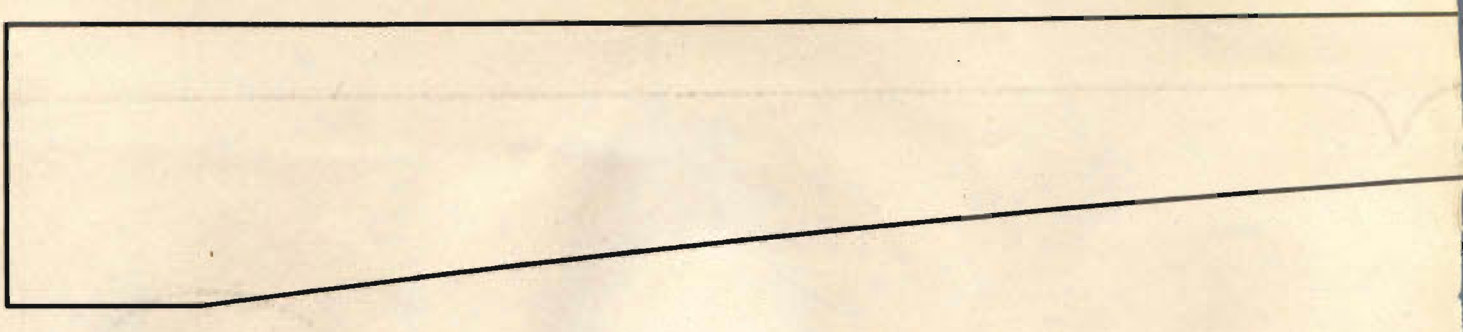
curved top edge version

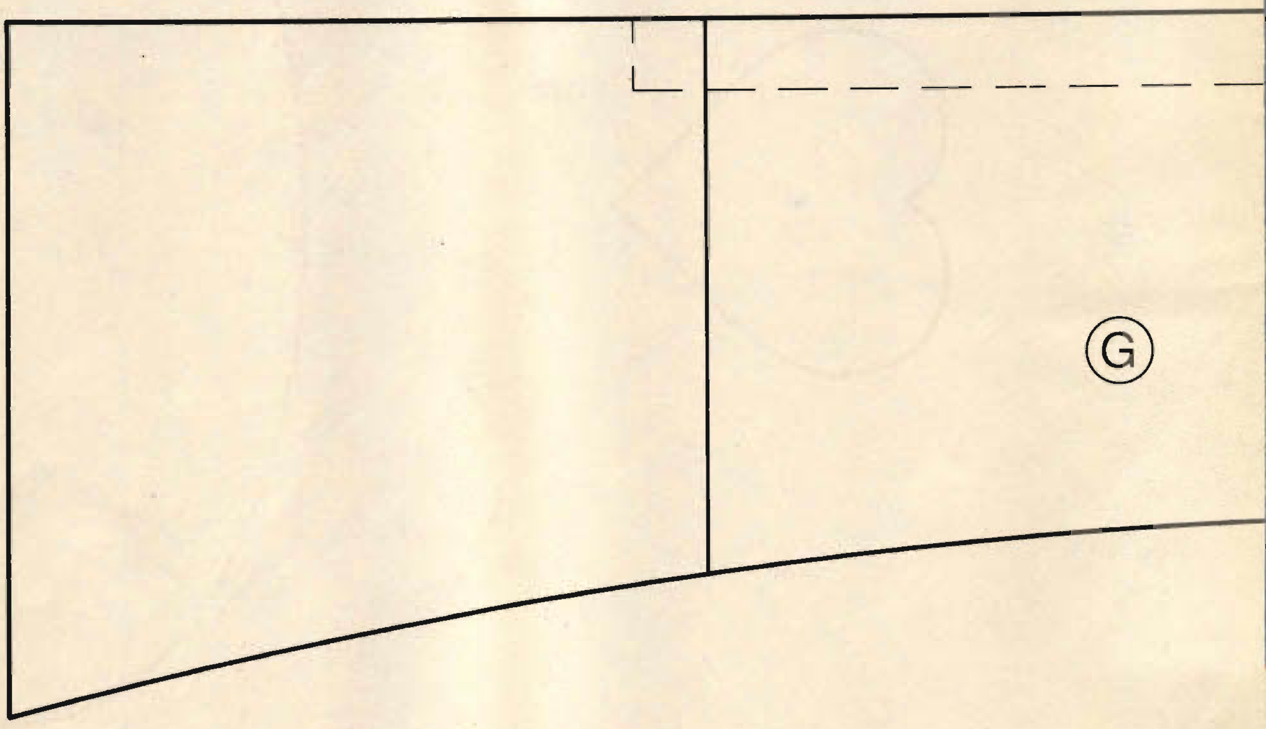
Full–Size Half Pattern

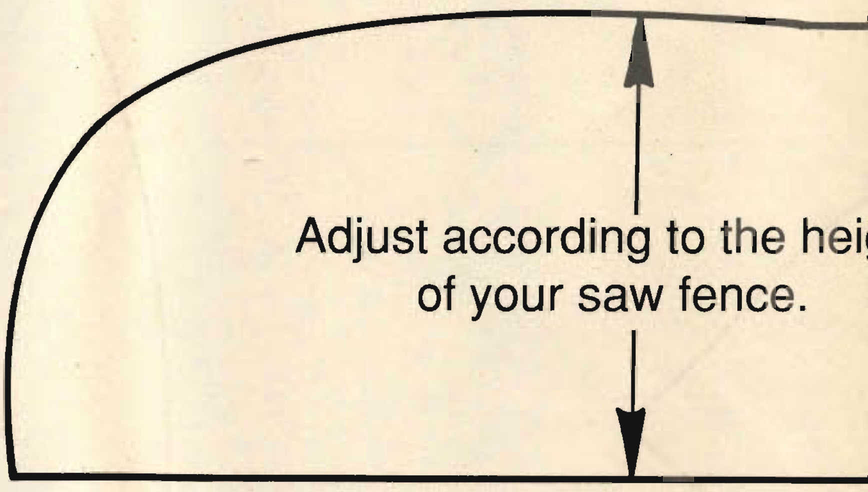
Ⓐ





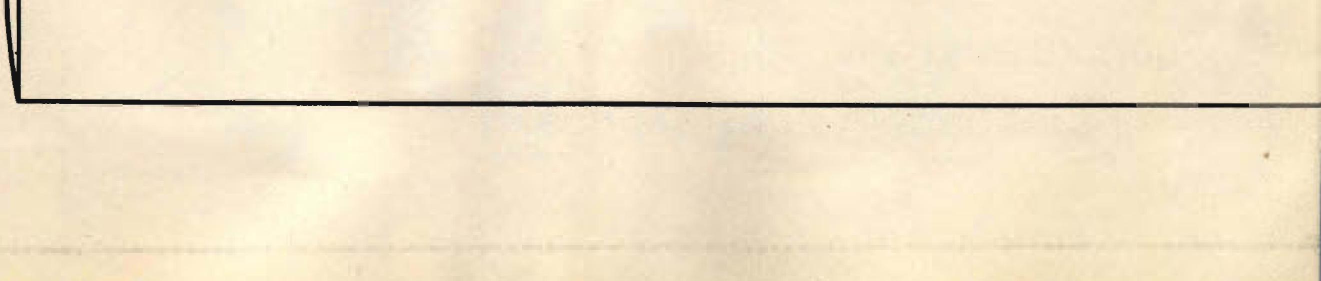





Adjust according to the hei
of your saw fence.

Contempo

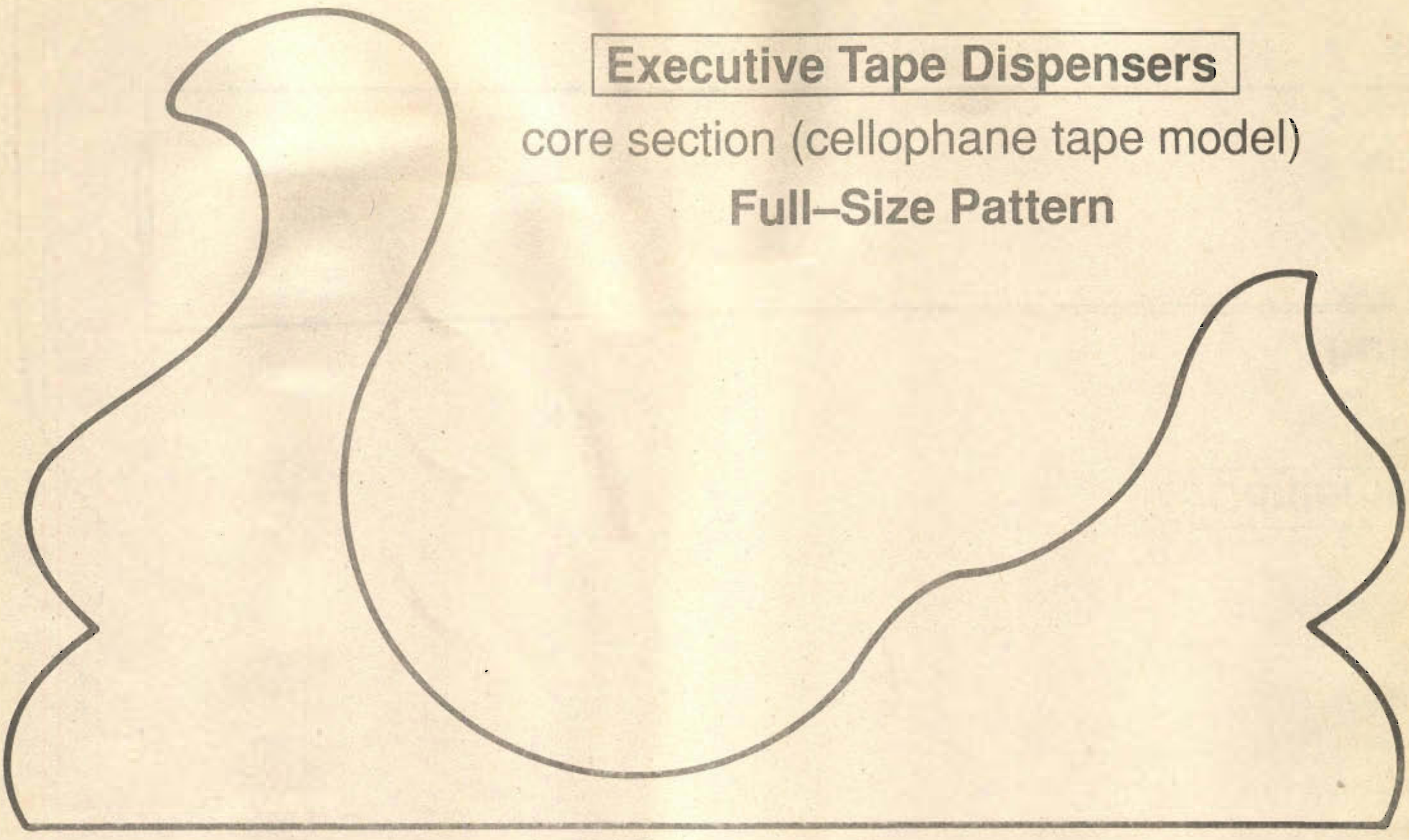
Full–

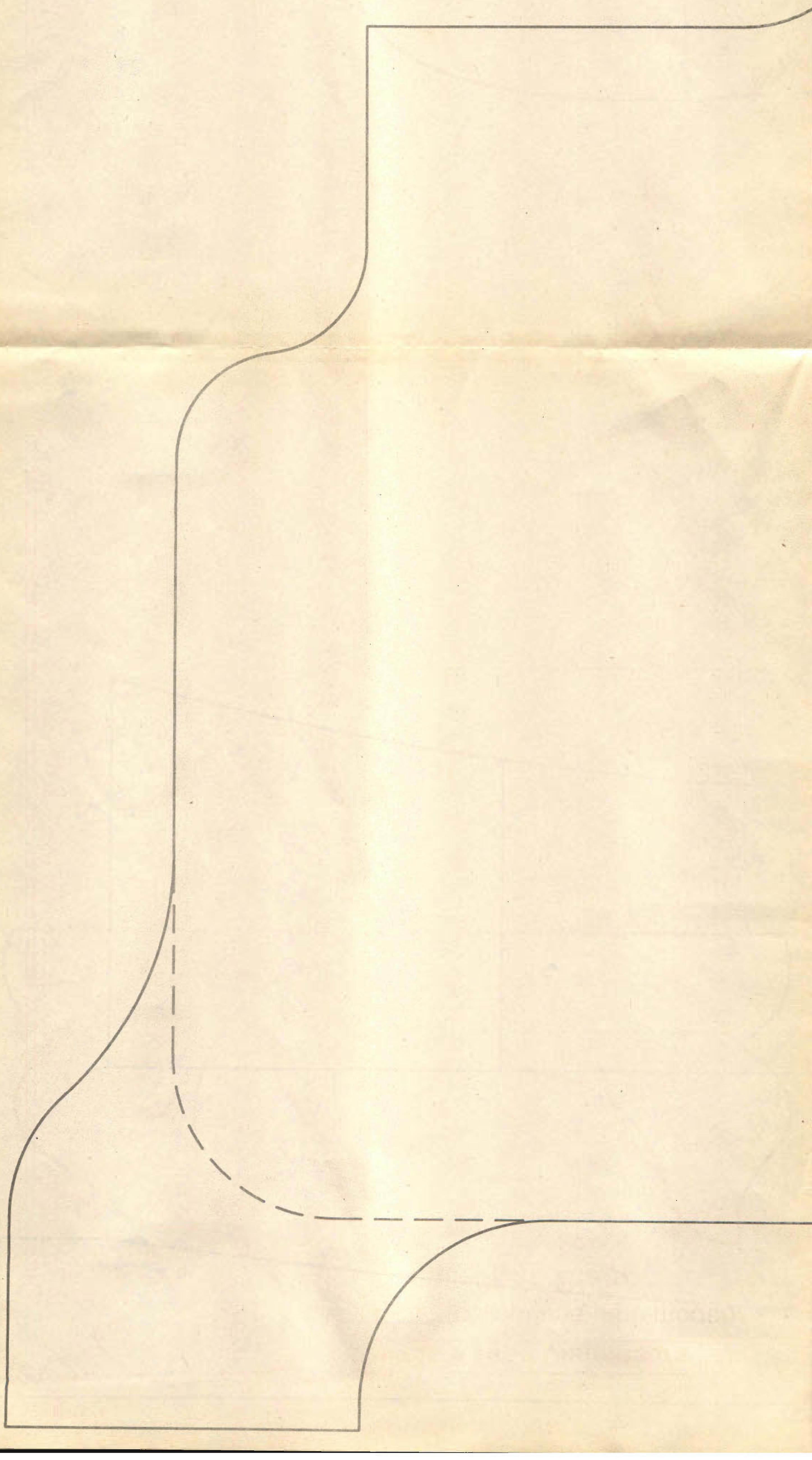


Executive Tape Dispensers

core section (cellophane tape model)

Full–Size Pattern

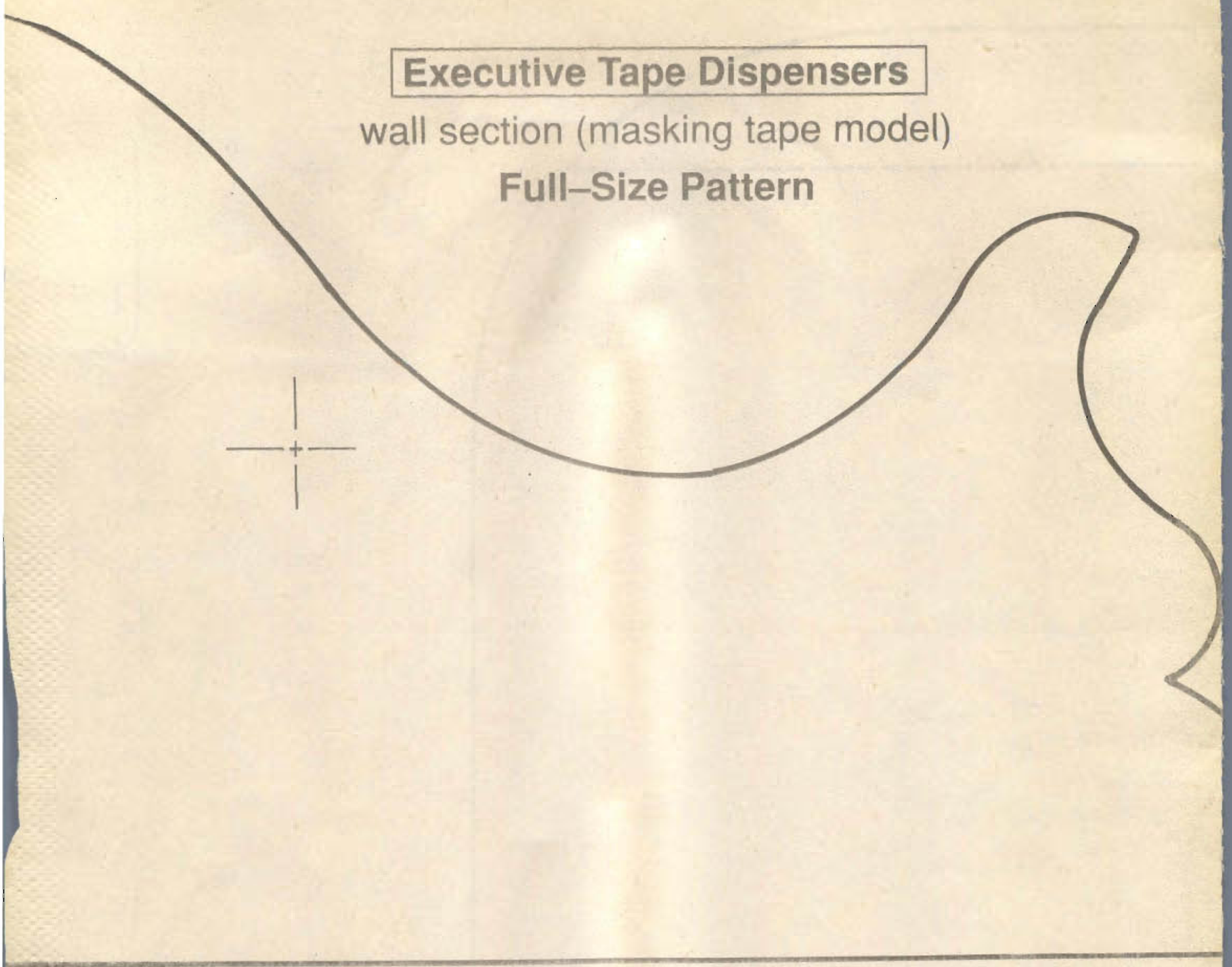


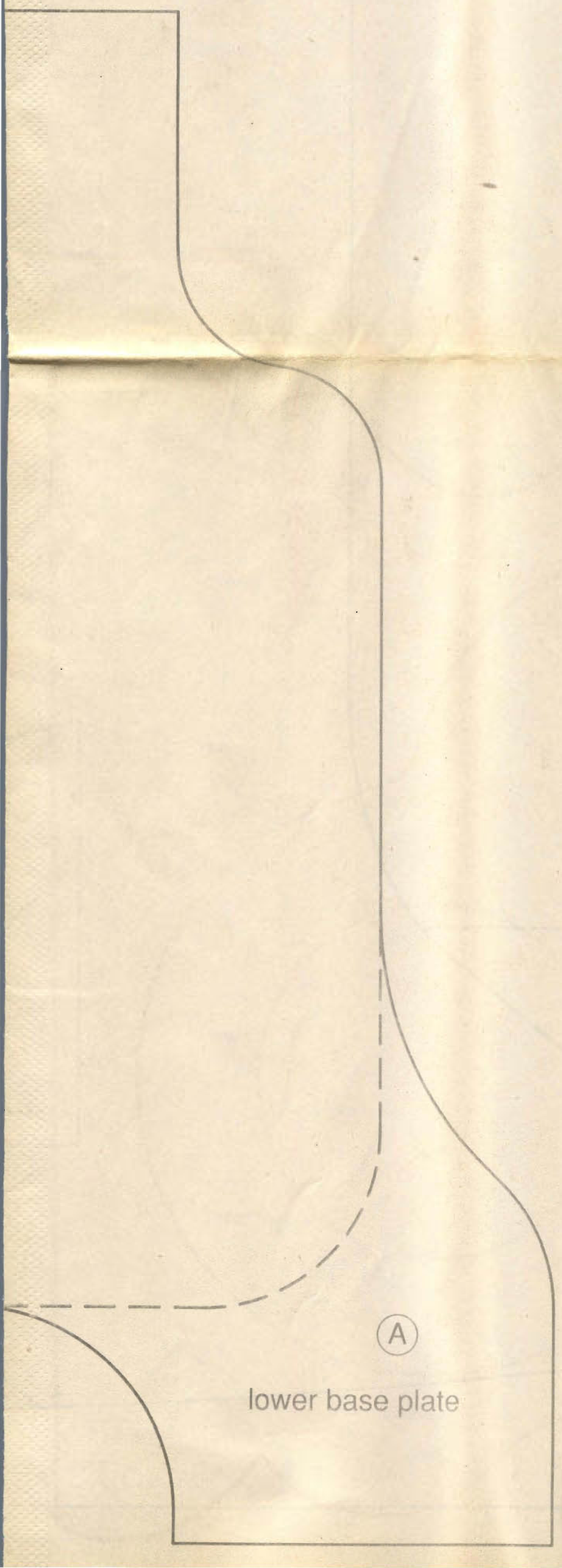


Executive Tape Dispensers

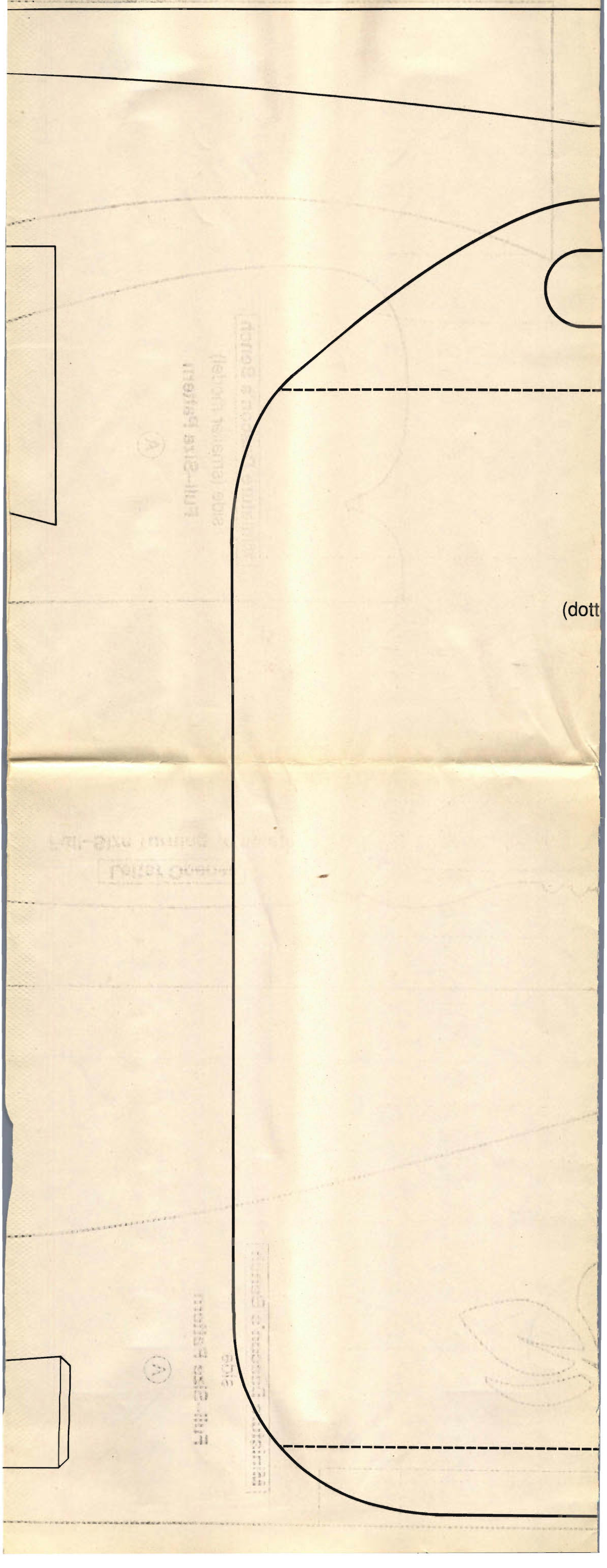
wall section (masking tape model)

Full–Size Pattern





Carefully open staples to remove plans, then bend them closed again.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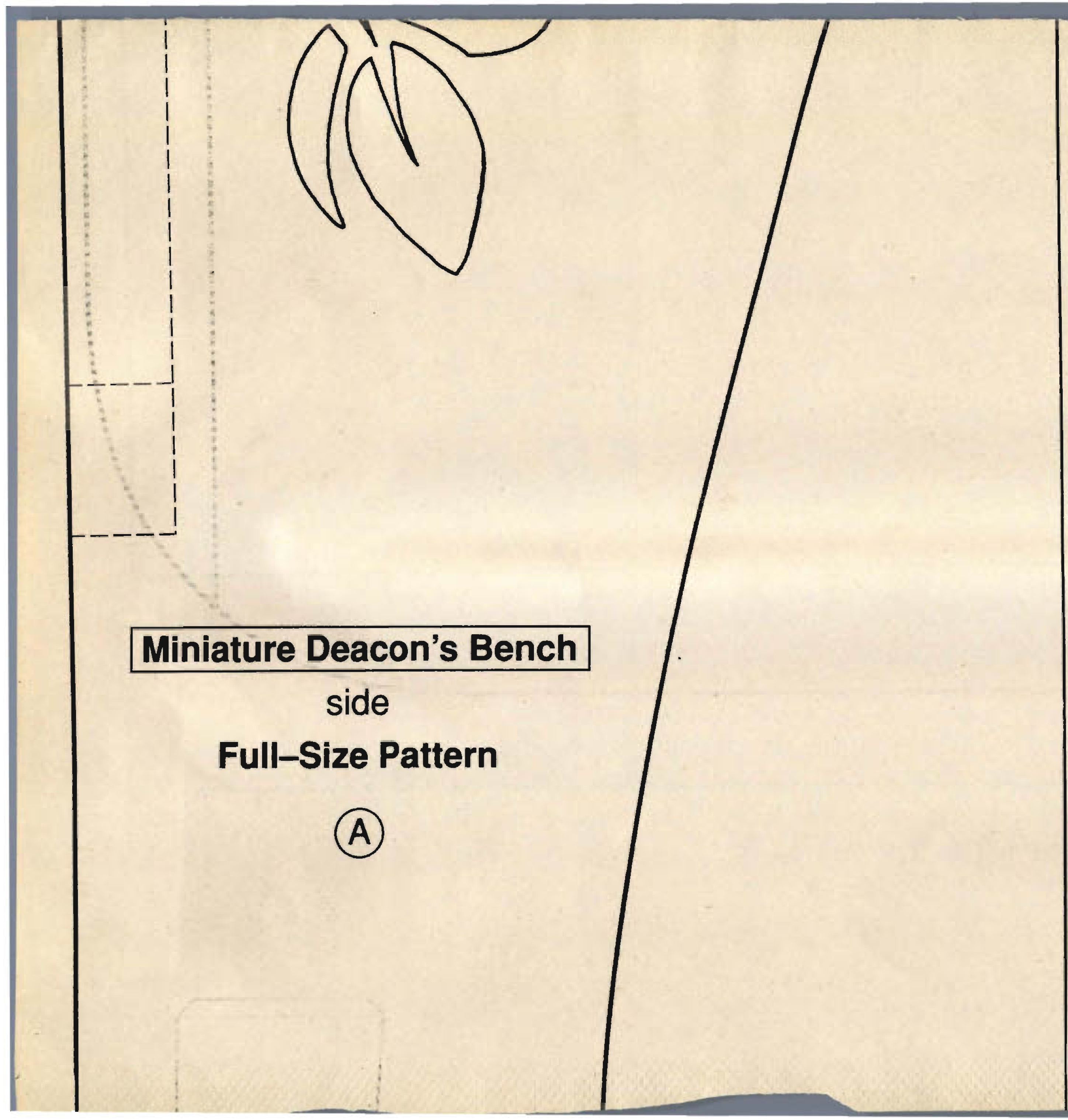
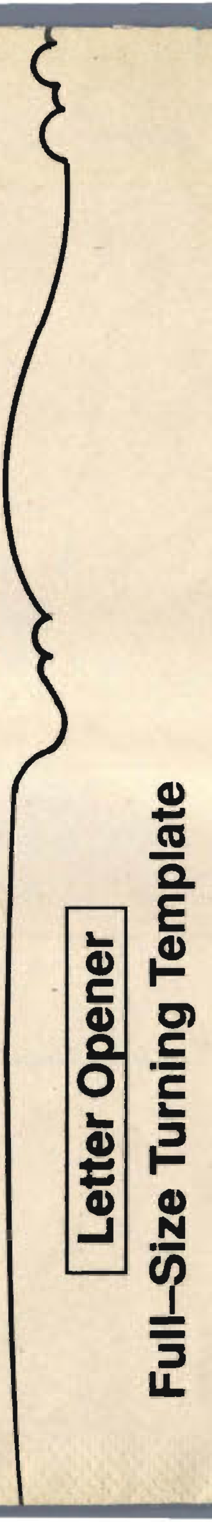


Miniature Deacon's Bench

side

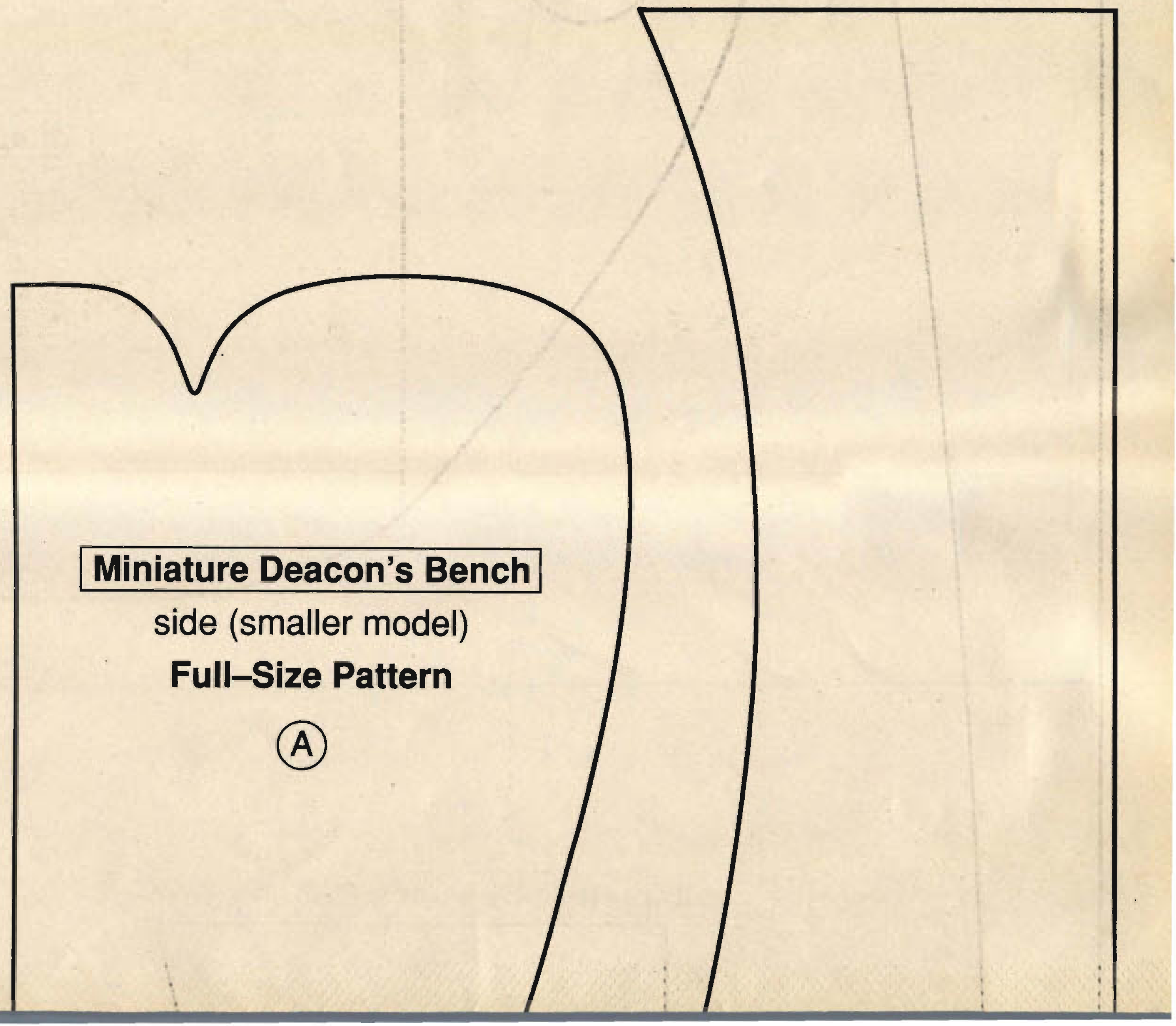
Full–Size Pattern

Ⓐ



Letter Opener

Full–Size Turning Template

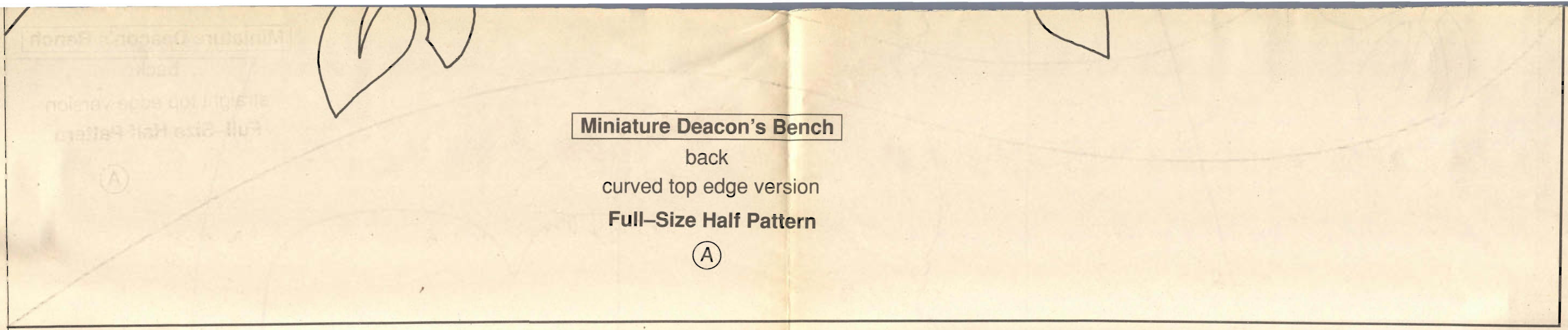


Miniature Deacon's Bench

side (smaller model)

Full–Size Pattern

Ⓐ



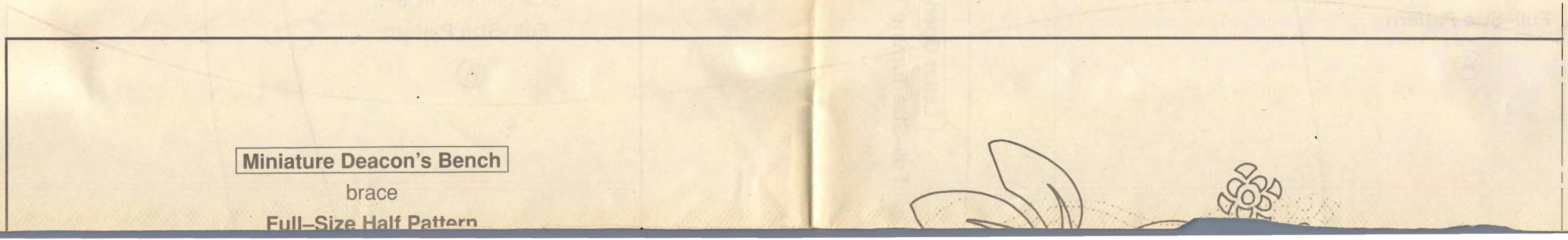
Miniature Deacon's Bench

back

curved top edge version

Full–Size Half Pattern

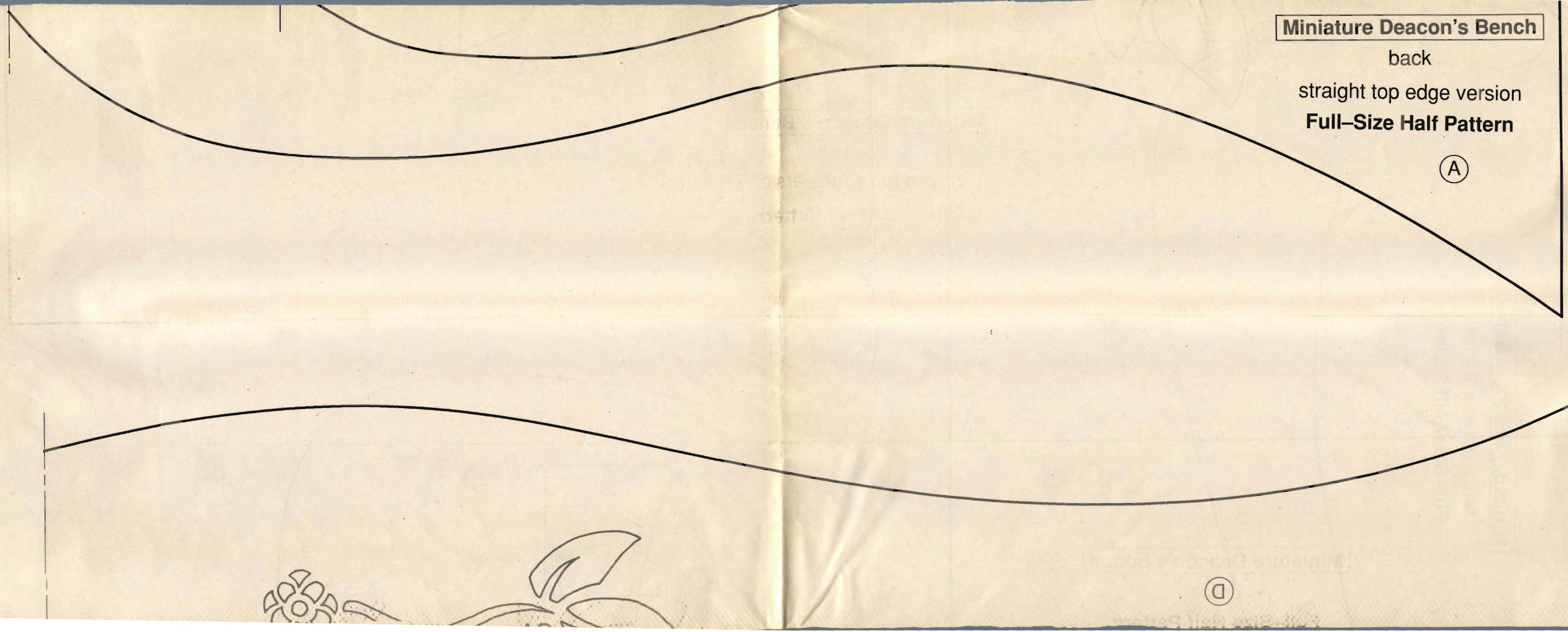
Ⓐ



Miniature Deacon's Bench

brace

Full–Size Half Pattern



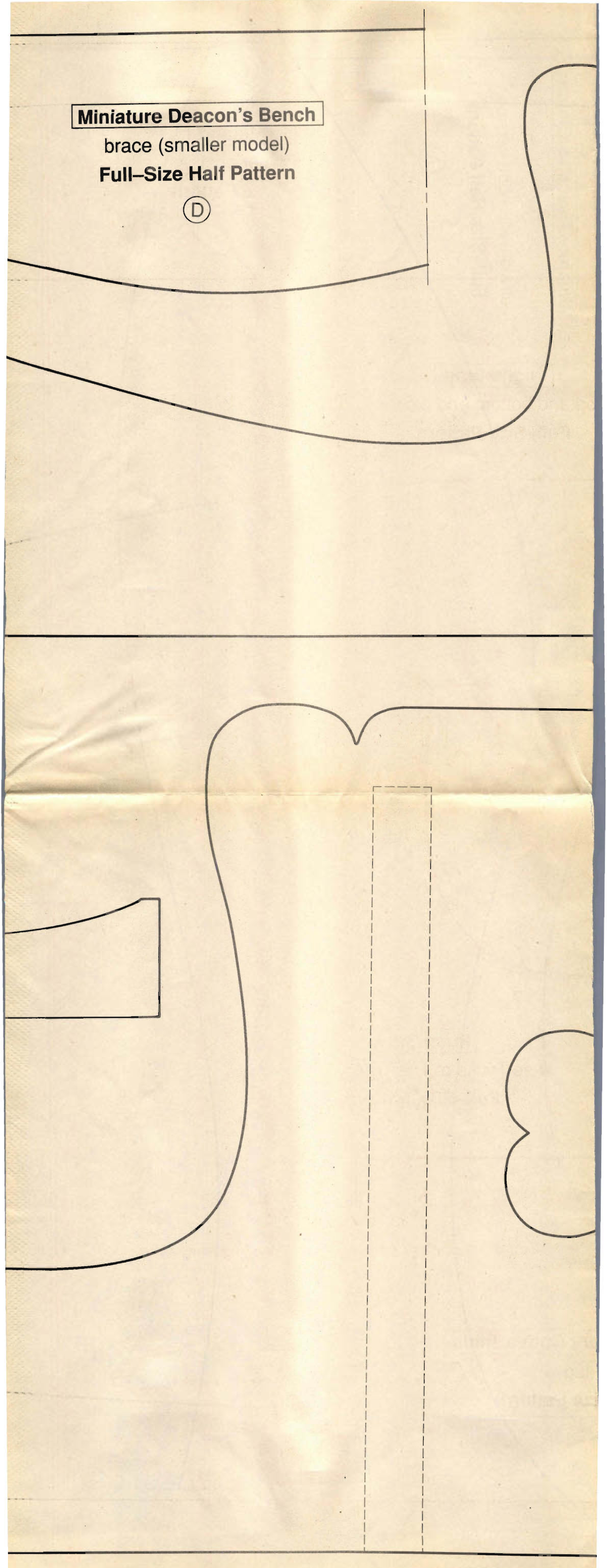
Miniature Deacon's Bench

back

straight top edge version

Full–Size Half Pattern

Ⓐ



Miniature Deacon's Bench

brace (smaller model)

Full–Size Half Pattern

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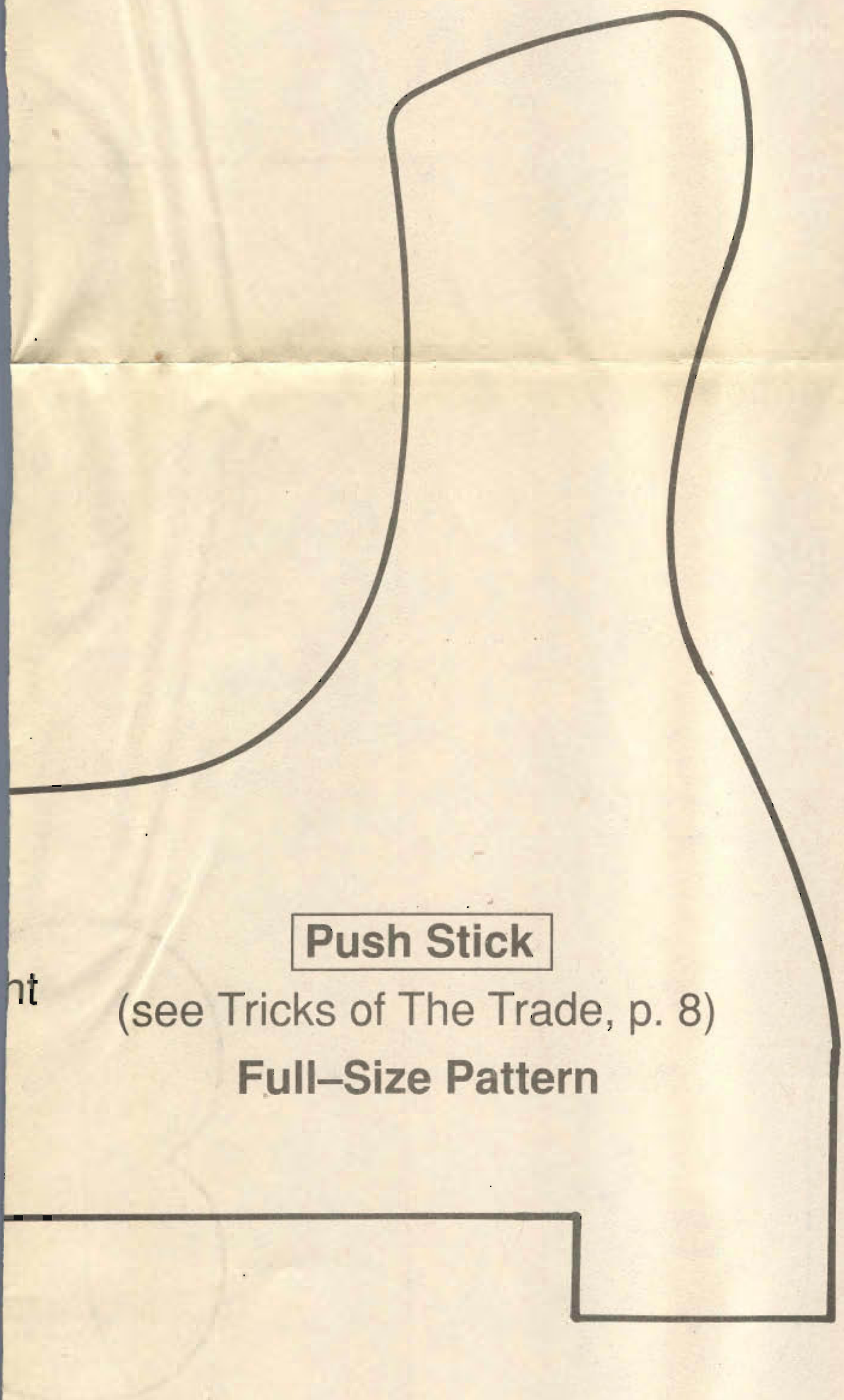
Nightstand
corner post
Full–Size Pattern

Nightstand
op and bottom end piece
Full–Size Pattern



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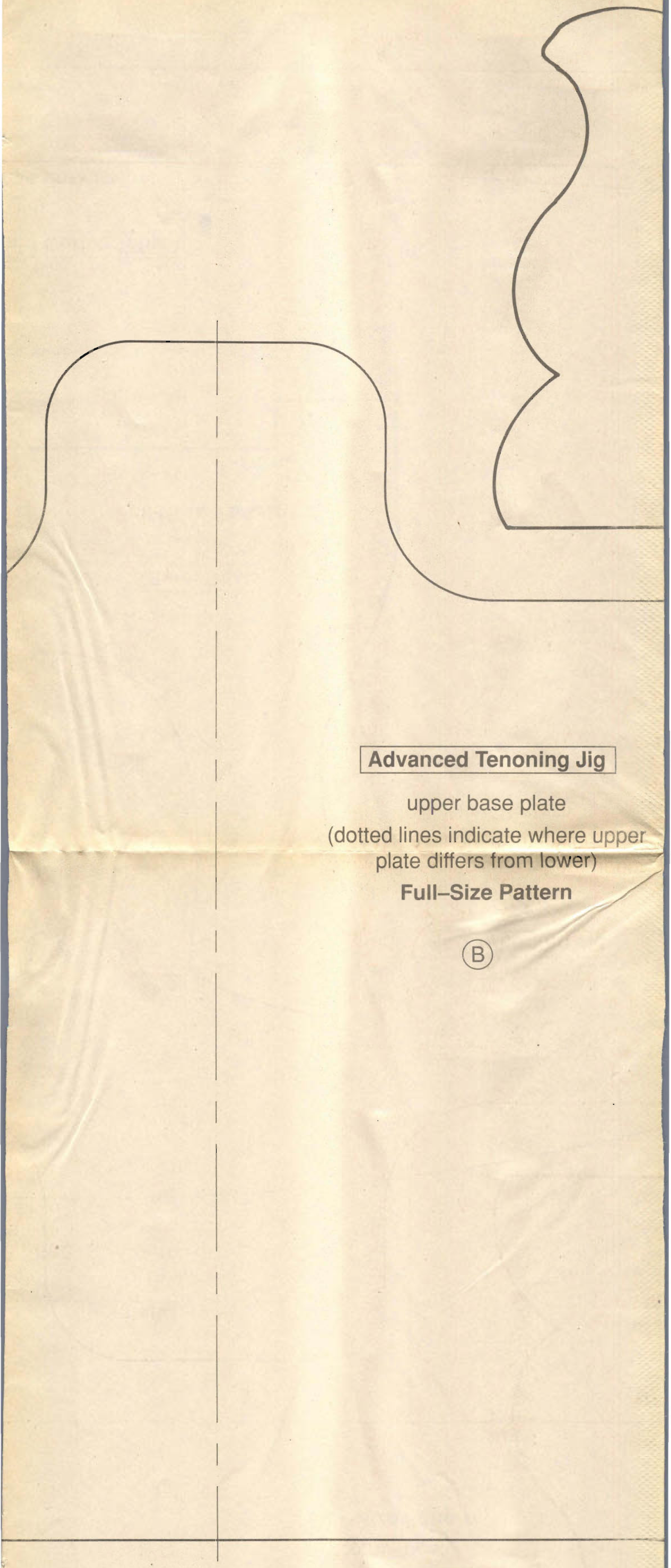
Push Stick
(see Tricks of The Trade, p. 8)
Full–Size Pattern

ary Coffee Table
leg
ize Pattern



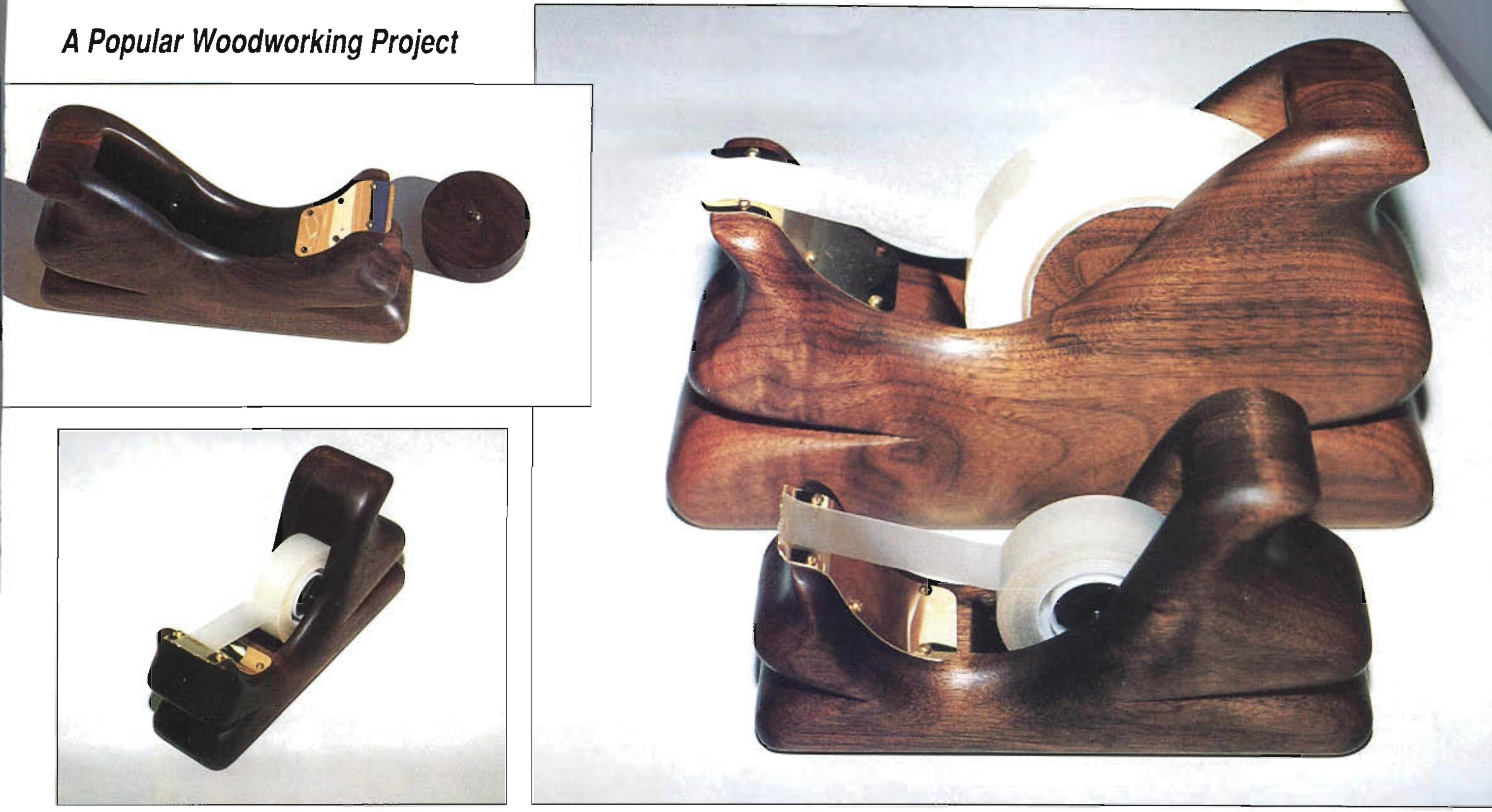
Advanced Tenoning Jig

upper base plate
(dotted lines indicate where upper
plate differs from lower)

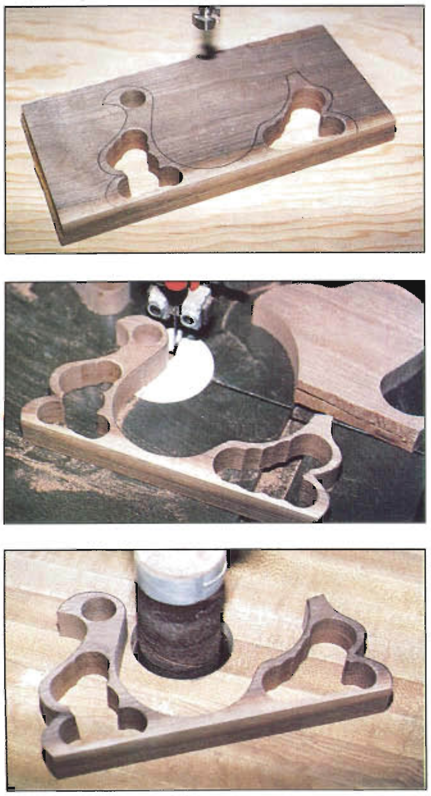
Full–Size Pattern

Ⓑ

A Popular Woodworking Project



EXECUTIVE TAPE DISPENSERS



Use a Forstner bit or scroll saw to remove wood within the core section for the lead weights. Then cut out the core and sand the curves.

author

by Dick Dorn

Here's an impressive pair of tape dispensers which are a lot easier to make than you might think. A core section consisting of two laminated boards (just one for the cellophane tape version) is sandwiched between two outside wall sections. The core is similar to the wall sections except that it includes a large recessed well to house the tape roll. You'll find full–size patterns for the main parts in the PullOut™ Plans in the center of the magazine. I'll describe the procedure for making the masking tape version because it's a bit more complicated.

Start With The Core

For the masking tape dispenser, laminate the two boards for the core section. The deep recesses and irregular curves require removal of much of the wood, and you'll surface the core to a thickness of 1⅛", so here's a chance to use wood with a few knots or flaws. Just arrange the pattern so it will bypass them. Place rough surfaces to the outside because the laminated surfaces should be smooth. The board for the core of the cellophane tape dispenser should be ⅞" thick.

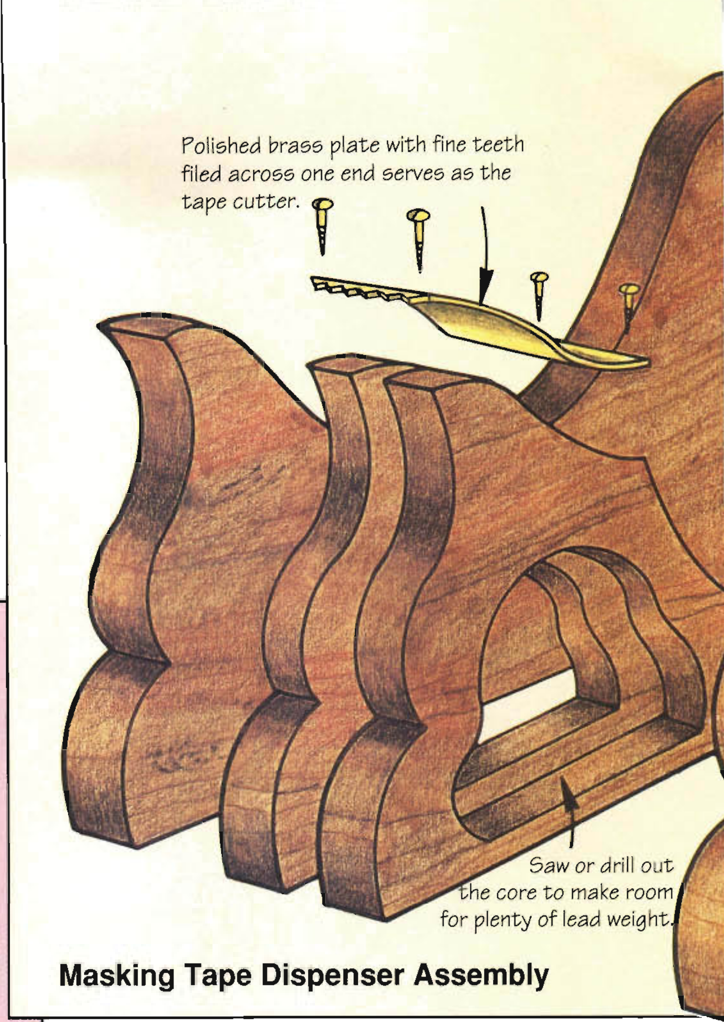
Before drawing around the entire pattern, establish a square bottom edge with the jointer. Then cut or drill out the recesses for the lead weights. Remove as much wood as practical. Carefully cut out the core piece, and sand the recessed tape well area.

Dick Dorn teaches high school woodshop in Oelwein, Iowa.

reparing The Tape Wheel

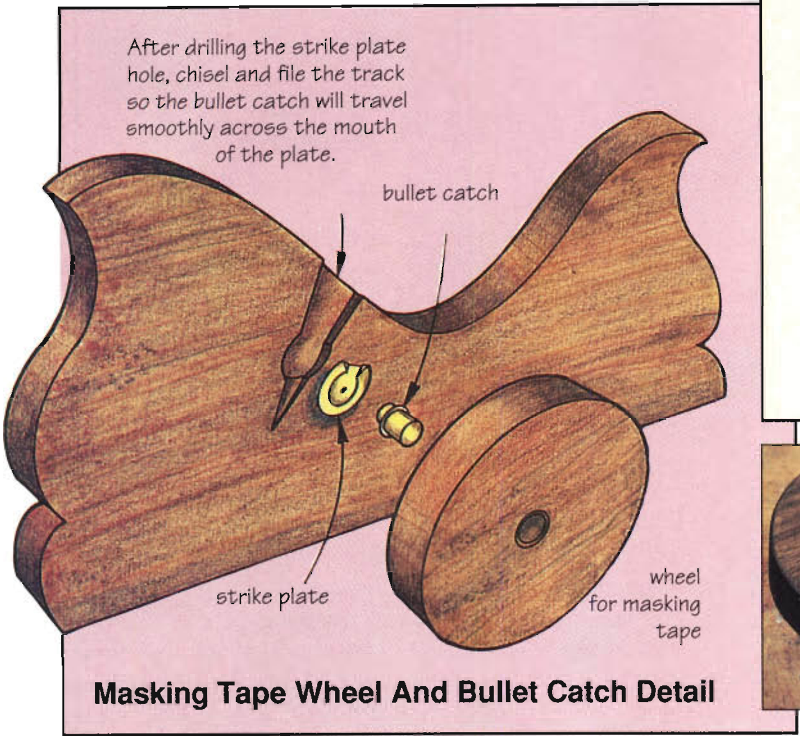
f you're making the smaller dispenser, purchase plastic cores, available in stationery stores, and skip ahead to the next section. For the larger one, salvage scrap large enough to make a wheel to fit inside a standard roll of masking tape. Draw a 3" diameter circle, cut it out on the band saw, and sand the edge until it fits snugly inside the tape roll. Drill a 21⁄64" hole through the center for the bullet catches which will hold the wheel in the dispenser. If you made the tape wheel from scrap left after cutting the core, it should now be 1⅛" thick; sand it with a belt or disc sander to a thickness of slightly more than 1".

Bullet catches have a small lip near the top of the barrel which limits the depth of insertion. It should be flush with the surface of the wheel, so ream the hole on each side with a countersink bit just enough to allow the lips to seat. You'll need the wheel with the bullet catches inserted for testing as you build the dispenser, but don't allow dust to gum the bullets. Remove them by pulling on the ball with pliers.


Polished brass plate with fine teeth filed across one end serves as the tape cutter.
Saw or drill out the core to make room for plenty of lead weight.

Masking Tape Dispenser Assembly

Bob Chapia


After drilling the strike plate hole, chisel and file the track so the bullet catch will travel smoothly across the mouth of the plate.
bullet catch
strike plate
wheel for masking tape

Masking Tape Wheel And Bullet Catch Detail

The masking tape wheel is held in the dispenser by a pair of bullet catches. Mount the strike plates so the mouth is flush with the bottom of the tapered track in the wall sections.

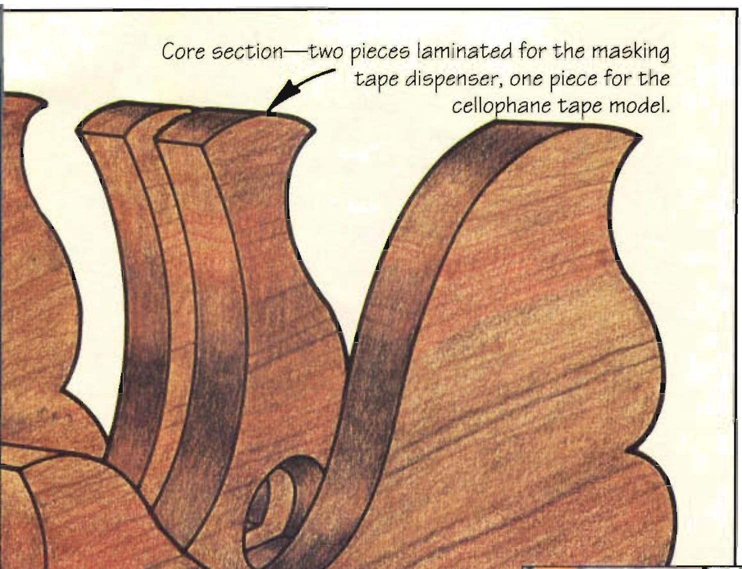
Outside Wall Sections Next

I used ¾" material for the outer walls of the large dispenser, but the thickness isn't critical. I've had good results with material as thin as ½", so don't hesitate to plane them to an equal thickness if you have some rough surfaces. For the smaller version, make the outer walls ½" thick. Cut the outside walls as you did the core—be sure to reverse the pattern for the second wall section. Transfer the lines indicating the track through which the tape core travels when it's inserted.

Hold the two wall sections together to make sure you've cut the tracks and rounded the recessed areas equally.

Drill a ⅝" diameter hole to a depth of 3⁄16" on the inside surface of each wall section to accept brass strike plates. Align the mouth of the plate between the two tapered lines and gently tap the plate to the bottom of the hole. Clamp the wall sections to a bench and use a round file to shape the tapered track leading to the mouth of each strike plate. A section through the widest portion of the tapered track should resemble a half–round approximately ¼" deep. The lower end of the track gets narrower and shallower, and should be flush with the mouth of the plate. Work on both tracks simultaneously so you can compare them. Permanently attach the plates with epoxy applied in the holes.

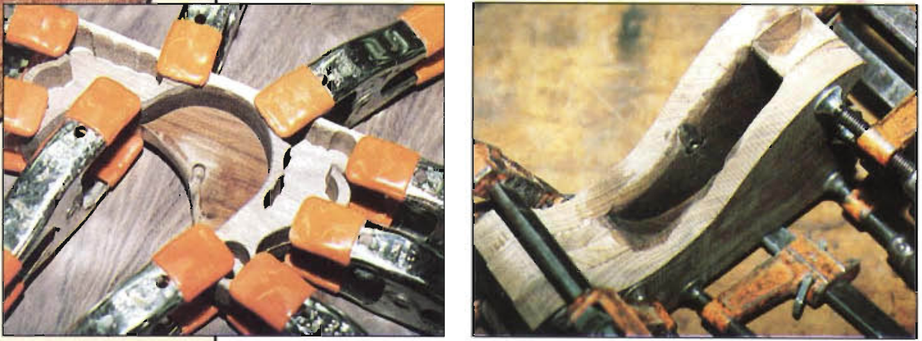
The track for the smaller model is about ¼" wide and 3⁄16" deep, and should curve down and forward so the tape core will bottom



Core section—two pieces laminated for the masking tape dispenser, one piece for the cellophane tape model.

Executive Tape Dispensers Cutting List								
Masking Tape				Cellophane Tape				
Qty	T	W	L	Qty	T	W	L	Piece
2	¾"	6³⁄₁₆"	10³⁄₁₆"	1	⅞"	4¼"	7⅜"	cores
2	¾"	6³⁄₁₆"	10³⁄₁₆"	2	½"	4¼"	7⅜"	walls
Supplies								
1	1½" X 3" polished brass plate							
6	#6 X ½" round head brass screws							
2	*bullet catches (masking tape version only)							
1	felt or cork base pad							

*Brainerd Bullet Catch, available from Paxton/Patterson, 5719 W. 65th St., Chicago, IL 60638. Tel. 800-323-8484; FAX 708-594-1087. Stock item 50-8196.



Use plenty of clamps when gluing the core and wall sections together. Line them up precisely—you don't want the tape roll sitting out of alignment.

author

Cut lead wheel or fishing tackle weights into small bits and epoxy them into the recessed areas in the core section. Lead shot works especially well because it fills the recess completely. Note also that the smaller dispenser needs only a groove cut in each wall to hold the roll of cellophane tape and its plastic core.

out and stay put when you pull tape from it. First drill the ¼" hole at the end of the track where the core will seat. Then cut the track to the holes with a ¼" Forstner bit or a rotary tool. Stand the wall sections together with the tracks aligned face to face, and check that they're identical.

Clamp the core section between the two outside walls and test the tape wheel fit. Bullet catches were designed for cabinets, and the ball travels over a rather high ridge before dropping into the strike plate cavity. Gently tap and lower the ridge with a rounded object until the fit is perfect. Sand the tapered tracks and the inside surfaces of the walls that will remain exposed.

The inside edge of the two wall sections spanning the mouth of the recessed tape well should be hollowed out and smoothed. Mark the start and stop of the span on each wall section, and use a router and a ½" radius rounding over bit. You won't be able to blend perfectly the corners of the tape well recess until after the dispenser is assembled.

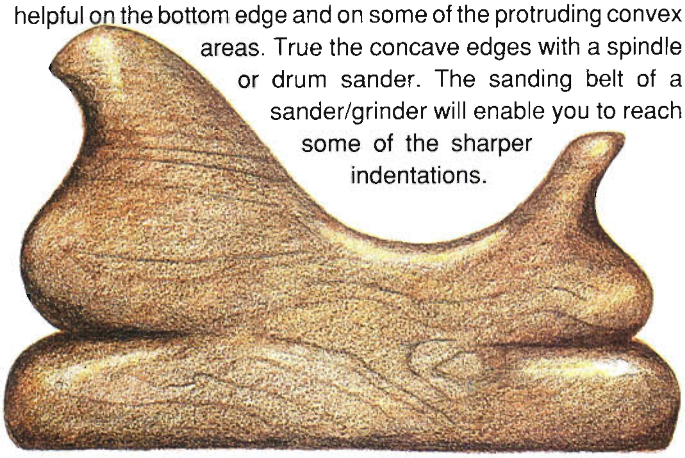
Build It Up And Weight It Down

Laminate one wall to the core with plenty of glue. Keep the pieces in perfect alignment, apply enough clamps, and allow the glue to cure completely. Place the partially assembled dispenser on one side—holes up—and fill them with lead weights. I was able to cast lead plugs for mine, but any type of lead will work as long as the holes are packed solid. Lead shot is especially effective because it fills the cavities completely regardless of their shape. I used yellow glue, or you can mix epoxy and pour it over the lead to seal it in place—nothing should rattle. The more weight, the better. It lowers the center of gravity, keeping the dispenser stationary when you tear off tape. If you use lead shot, you can get the large dispenser up to 9 lbs and the small one over 2½ lbs.

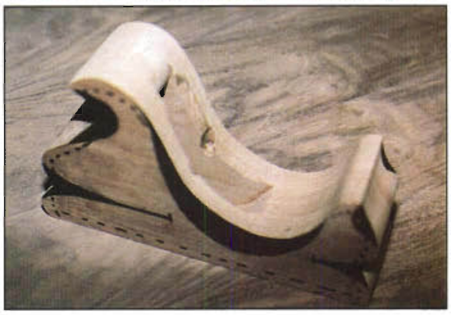
Laminate the remaining wall to the opposite side of the core. If any lead or epoxy protrudes above the surface, file it off. Clean any excess glue out of the recessed tape well before it has a chance to cure.

Sculpting—A Little Elbow Grease

The dispenser is ready for shaping. Start by machining all the exterior edges of the laminated boards until they're square and flush, and the pattern profile is perfect. A disc sander will prove helpful on the bottom edge and on some of the protruding convex areas. True the concave edges with a spindle or drum sander. The sanding belt of a sander/grinder will enable you to reach some of the sharper indentations.



Lay out the sculpting lines and rout around the entire pattern on both sides with a ½" round–over bit. Chisel, rasp, file, carve and sand all edges. You should take full advantage of the thick walls to sculpt out the concave areas deeply. Continually compare one side with the other and view the work from all angles as you proceed. For the tape cutter, use a polished brass jewelry plate and a simple bending jig like the one shown in the photo on the far right.



author

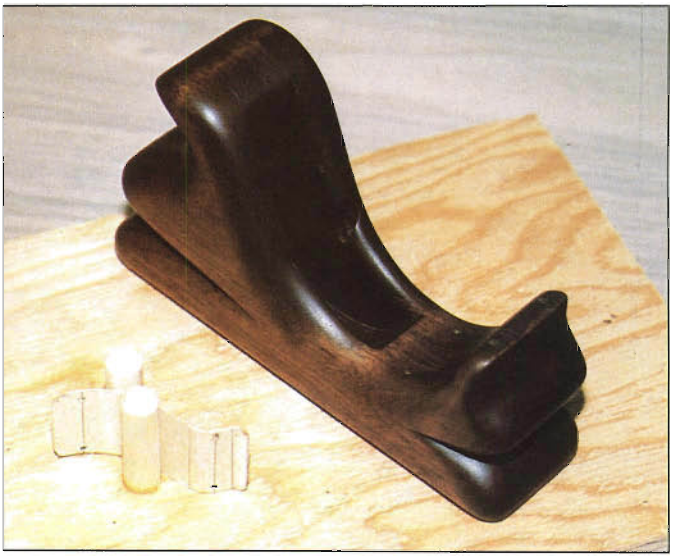
Begin sculpting by routing around the entire pattern on both sides with a ½" radius roundover bit. Emphasize the concave areas of the pattern and don't hesitate to cut and file deep into the wall sections. Continually compare one side with the other and view the work from all angles. Its real beauty begins here, so use a variety of files, sandpaper grits and elbow grease. Start with 60–grit paper and gradually work down to 400–grit for the final sanding.

The Brass Tape Cutter

You can fashion a solid brass tape cutter from a 1½" X 3" plate available at jewelry stores. For the smaller model, you'll need one measuring 1¼" X 2¾". If the polished brass plate comes with a protective peel–off paper, don't remove it until you're ready to install the plate. Add a layer of masking tape for further protection when the plate is in the vise, and because you'll need to draw reference lines on its surface for drilling and bending. Drill three holes along each edge of the plate. Mark the centers about 3/16" in from the edges (⅛" for the smaller one). Clamp the plate in a vise so the future cutting end protrudes from the jaws; use a fine three–square file to cut a saw–toothed edge. Finely cut teeth look and work better than large deep ones. Round the four corners of the brass plate with a file or disc sander.

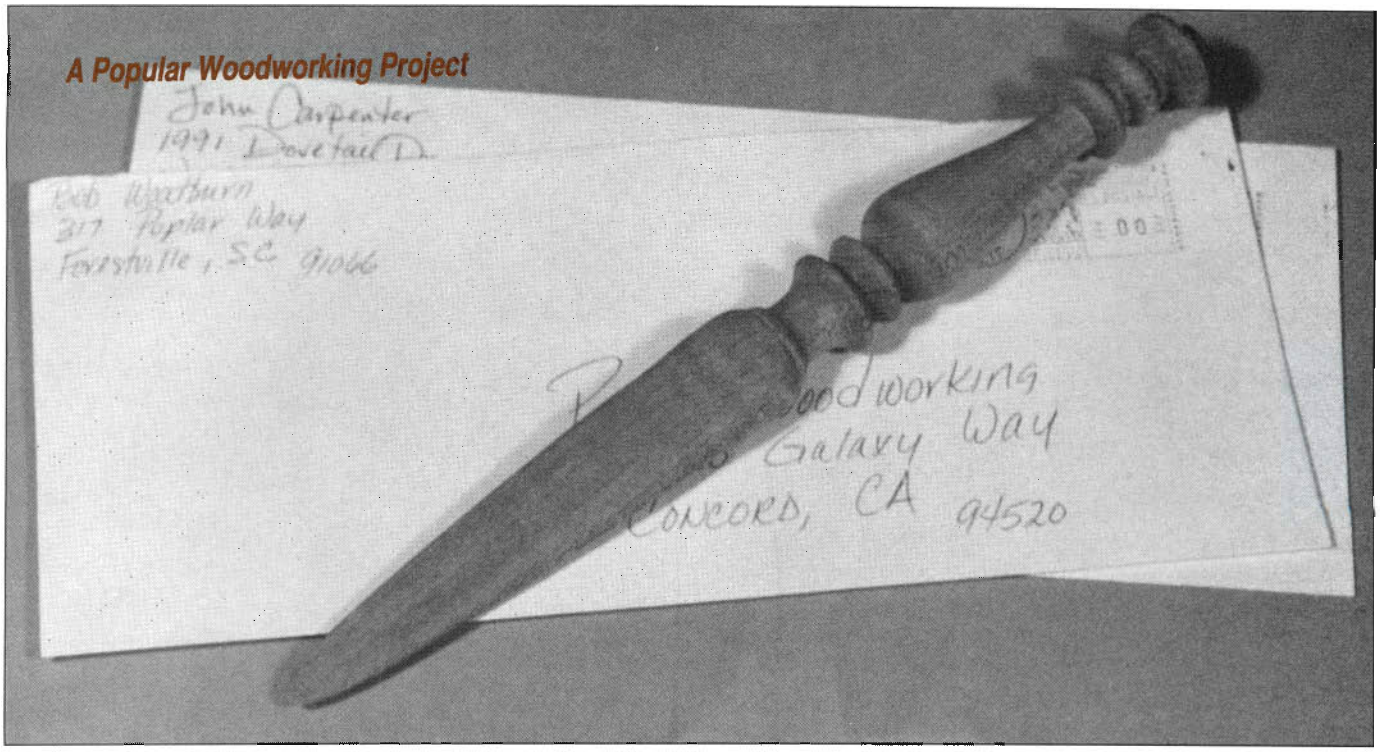
About 3/16" in from the saw–toothed edge, draw a guide line parallel to the teeth; insert this edge in a vise so the jaws meet on the line and bend the plate to a 45° angle (20° for the smaller model). Bend so the toothed edge will be turned up when the cutter is installed. I placed a backing board against the plate, held the board firmly near the vise jaws, and pressed forward.

The cutter must conform to the curvature of the dispenser and the teeth should project about 3/16" past the wood. Start bending at the top and work downward. A simple bending jig—two dowels sturdily anchored ¼" apart in a base board—makes the job much easier.



Finishing And Final Assembly

Any fine finish is appropriate for these classy tape dispensers. I used a penetrating stained oil. You can glue a felt or cork bottom to the dispenser, but a sheet rubber pad is best. Screw the brass cutter in place and start making the other model. Don't be surprised if everybody wants a pair. PW



Turning A Letter Opener

by John Leeds

Let's be honest, almost every woodworker has a thing about the feel of finished wood. As you pass a fine piece of craftsmanship can you even stop yourself from reaching out and touching it? If you're like most of us, you'll at least give it a quick glide-over caress.

Well here's a project that will allow you to enjoy the feel of fine wood in your hand almost every day, and will enhance your desk all of the time. Start with a 1" square by 11" long piece of wood. Almost any material or combination of laminated materials will do.

Find the center points on each end of the piece and set it up on the lathe. Turn the blank round; then lay out the pattern in the Pull–Outs so there is about 1/2" to 3/4" of unturned material at each end. Use these later as guides and places to hold when you trim off the sides of the blade.

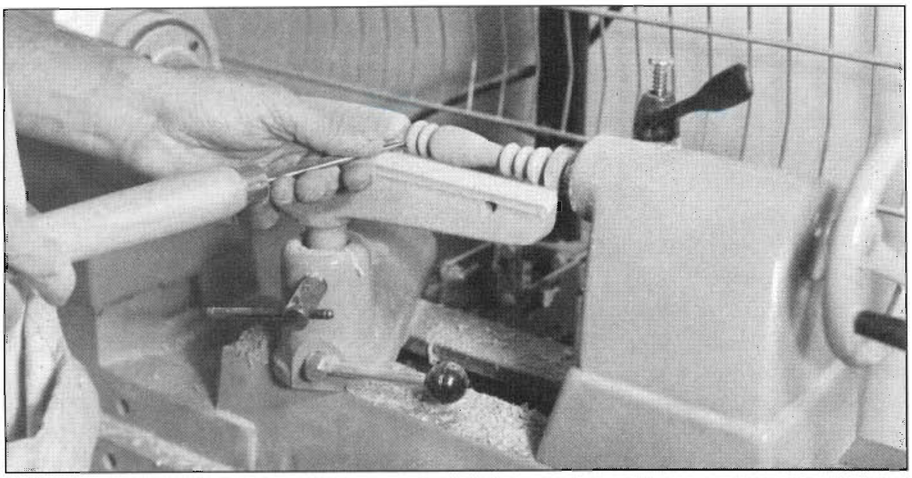
If you want to use different wood types for the handle and blade, turn an extended 1" long by 3/8" wide tang on one end of the blade section to glue and insert into a predrilled hole in the center of the handle section (see the Figure).

After the shape has been turned out, sand the handle smooth. Start off with a heavier grit and sand through 400 grit. If you don't want to use any finish material on the letter opener, you can burnish the handle at this time with the shavings from your turning.

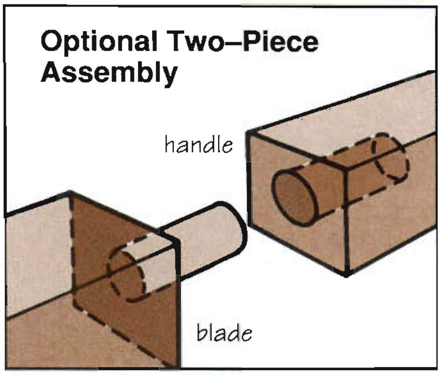
Flatten the blade section to around a 1/4" to 5/16" thickness by sawing the sides off on the band saw. Then file and sand the blade smooth, leaving the cutting edges sharp enough to cut warm butter. Sand the blade as you did the handle and burnish or finish with a tung oil or a final coat you prefer.

Now you have a great gift for yourself or someone else that will be used and appreciated for years to come. PW

John Leeds is a woodworker from Ojai, California.

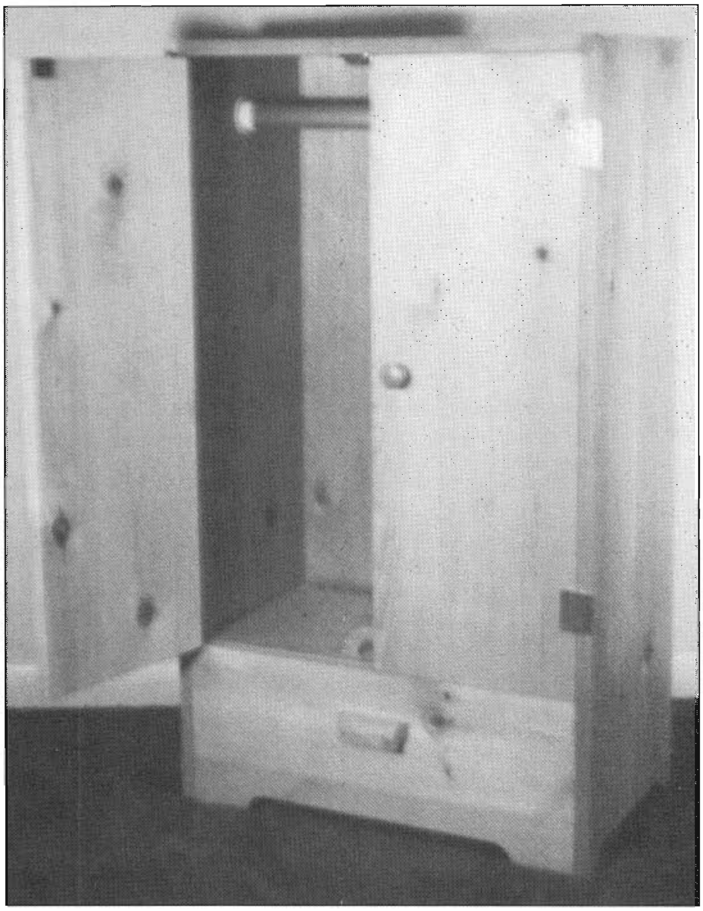


Bob Chapla
Carol Law



Optional Two–Piece Assembly

Child's Wardrobe



photos by the author

by Jacob Schulzinger

A child's wardrobe is one of the most useful pieces of furniture you can build for a tot as it will be in use every day until the youngster is tall enough to put his or her clothing away in the closet. This piece features a storage area in its bottom with a lid that is accessible only when the wardrobe doors have been opened. A special support keeps the lid from dropping on the child, and the storage box concept will help prevent accidents as there is no pull–out drawer to tempt its use as a stepstool.

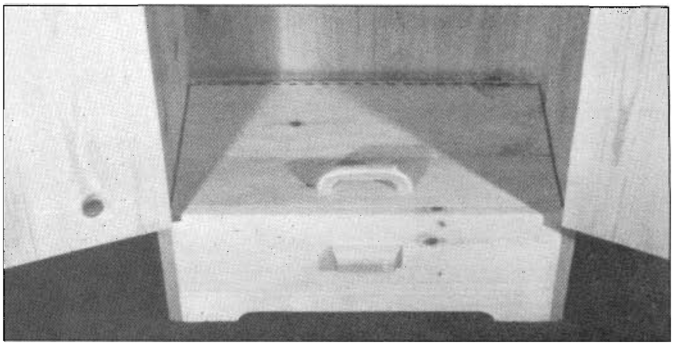
Designed as a companion piece for the Child's Cupboard (*PW* #46), the unit is built of pine and is a very straightforward project using biscuit joinery for most of its construction. For those woodworkers who wish to build this project but do not have a biscuit joiner, the project can be built using splines, dowels or tongue–and–groove construction.

Start the project by making up the panels you'll need for the sides (A), top (B), base (C), compartment lid (D), and doors (E) (see Figure 1). I cut pairs of 1 X 8's to rough length (at least 1" longer than indicated in the Cutting List) for the 13" wide panels, and a 1 X 6 and 1 X 8 for each of the 11$^1/_2$" wide panels. Joint the mating edges of the boards, and lay them out in pairs with the good side up to mark them for cutting the biscuit slots. Strike marks across both boards starting at 3" in from the ends; then divide the space in between with marks that are 6" to 8" on center.

After all of the biscuit slots have been cut, glue up the panels, one at a time, and allow the clamps to remain in place for about 15 minutes to let the biscuits swell before going any further. Because of the relatively short clamp time required for biscuit joinery you should be able to do most of this gluing in a single session.

Use a 2" diameter hole saw to shape the ends of the cutouts along the bottom edges of the sides (A). First, trim the best end of each panel; then measure from the trimmed end to locate the centers for the hole saw (see Figure 2). When you're done with the hole saw, cut the pieces to the finished length and finish making the cutouts with a band saw or saber

The base has a storage compartment with a false drawer front. If it had a real drawer, the youngster might be tempted to use it as a stepstool.



***Jacob Schulzinger** is an industrial engineer in the aerospace industry. Woodworking is his part-time business and hobby.*

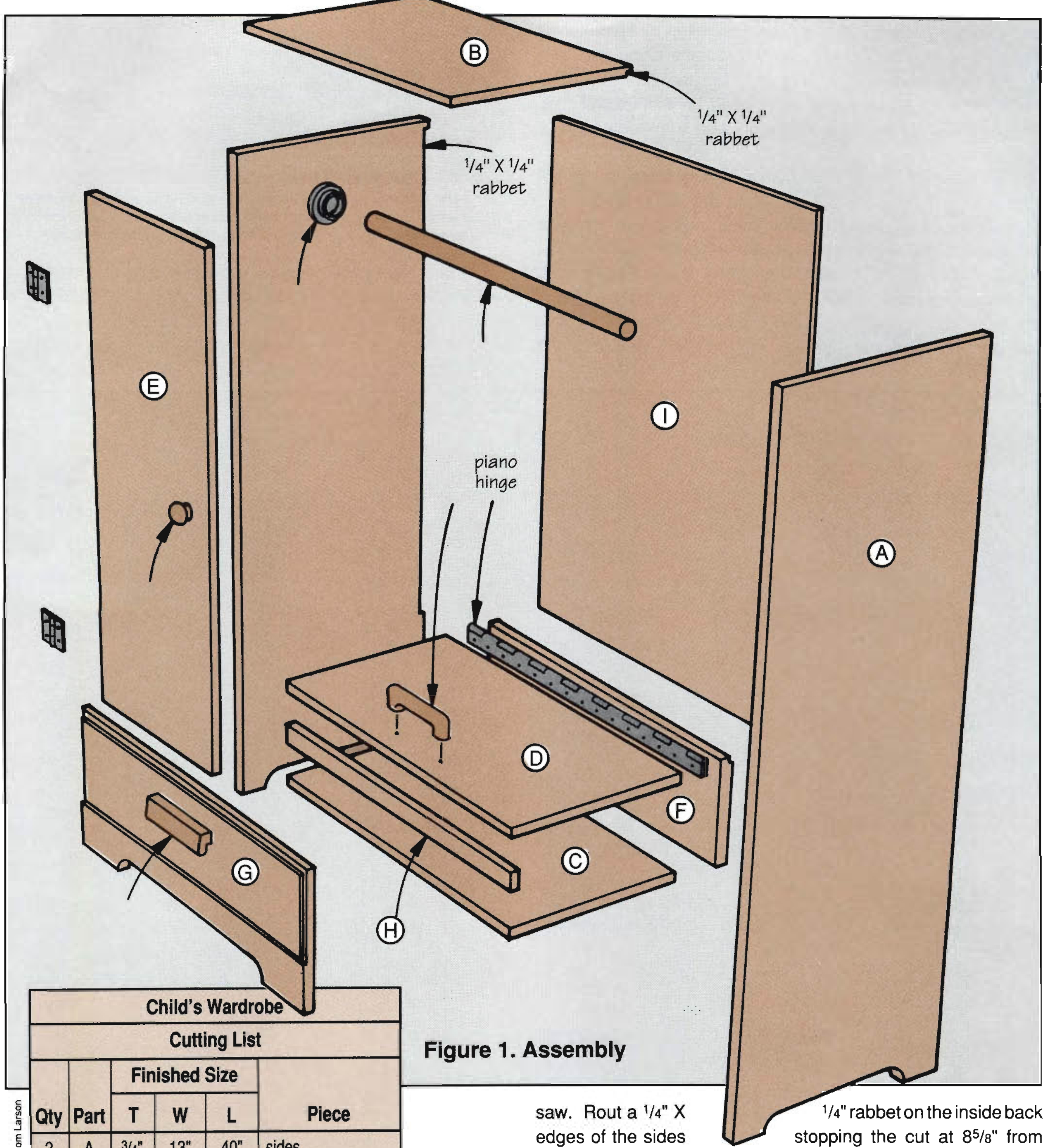


Figure 1. Assembly

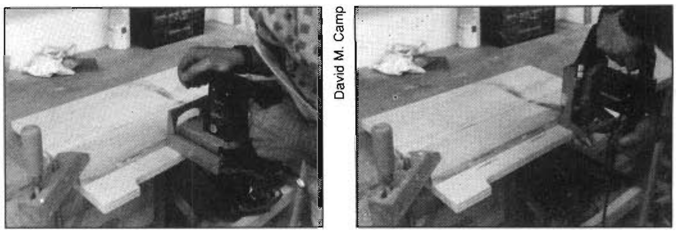
Tom Larson

Child's Wardrobe					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	3/4"	13"	40"	sides
1	B	3/4"	13"	21 1/2"	top
1	C	3/4"	11 1/2"	21 1/2"	base
1	D	3/4"	11 1/2"	21"	compartment lid
2	E	3/4"	11 1/2"	32"	doors
1	F	3/4"	6 7/8"	21 1/2"	compartment back
1	G	3/4"	8 7/8"	21 1/2"	front panel
1	H	3/4"	1 1/2"	21"	lid support
1	I	1/4"	22 1/4"	31 1/8"	back

saw. Rout a 1/4" X 1/4" rabbet on the inside back edges of the sides stopping the cut at 8 5/8" from the bottom as shown in Figure 2.

Now begin work on those pieces which will determine the final width of the unit. These parts include the top (B), the storage compartment back (F), base (C), and front panel (G). Crosscut all parts using a stop block to ensure that they are exactly the same length. Use a hole saw to prepare the cutout at the base of the front panel as before, and then rip the board to its final width. Complete the cutout on a band saw or with a saber saw and then dress up the edge with a cabinet file and sandpaper. To prepare the dummy drawer front, merely set the table saw blade for 1/8" depth of cut and make a single, ripping–type cut along the top edge of the panel (essentially a rabbet) and another such cut 6 1/8" down from the top. Set a router for the same depth of cut and rout two rabbets along the ends of the board, making sure that they are the same width as the saw slots and they do not extend past the lower slot. These side slots will have to be finished with a chisel or a sharp knife.

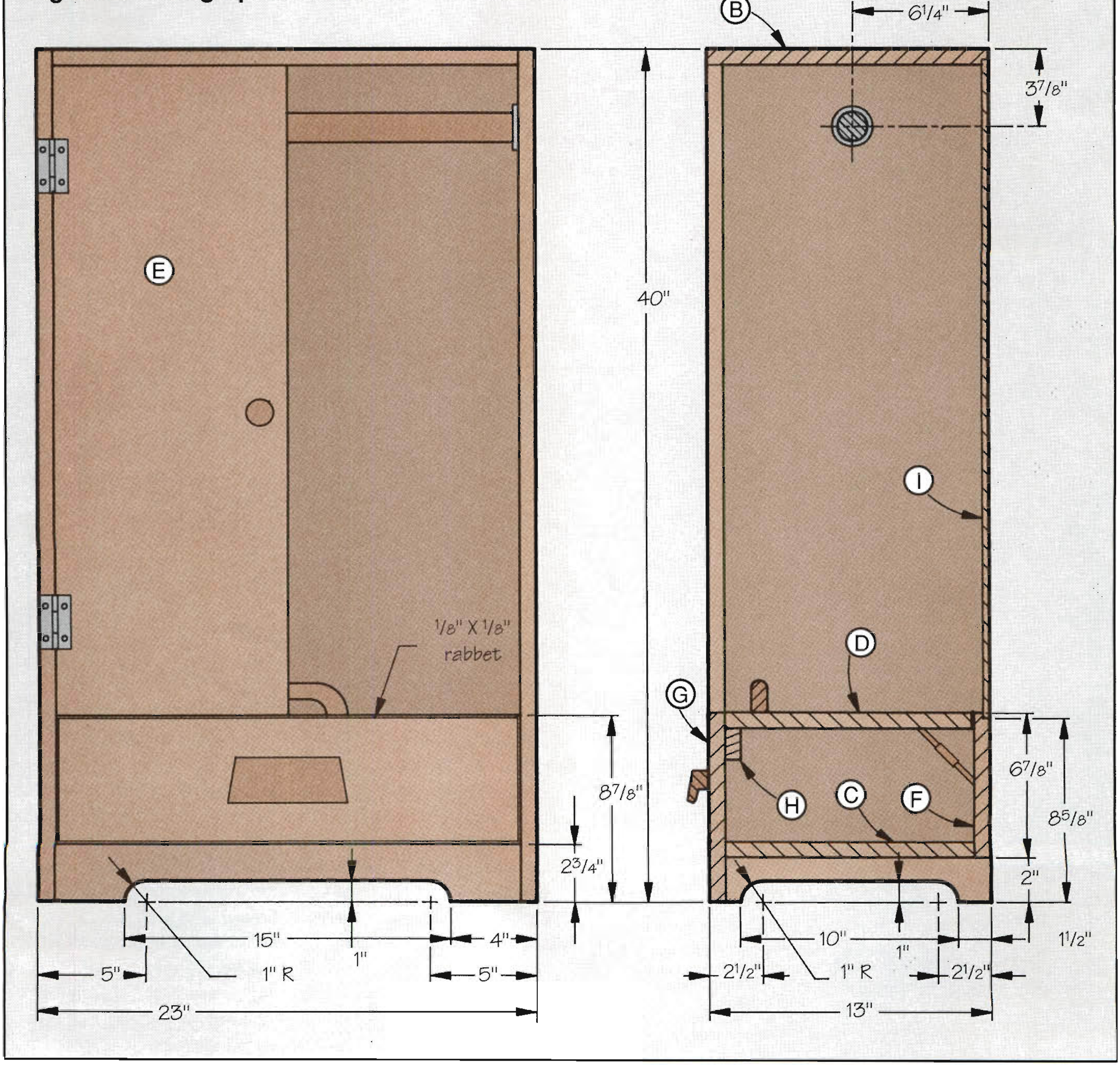
The lid support (H) is made from a piece of scrap that is 1 1/2" wide and is trimmed to 1/2" less than the length of the rest of the parts making up the compartment. Break the top edge of the support where small hands will rub against it, and sand it smooth. Rout a 1/4" X 1/4" rabbet along the top back edge of the compartment back (F) and the inside back edge of the top (B) to receive the 1/4" plywood back (I) that will enclose the upper portion of the wardrobe. Finish sand all of these parts for assembly.


David M. Camp

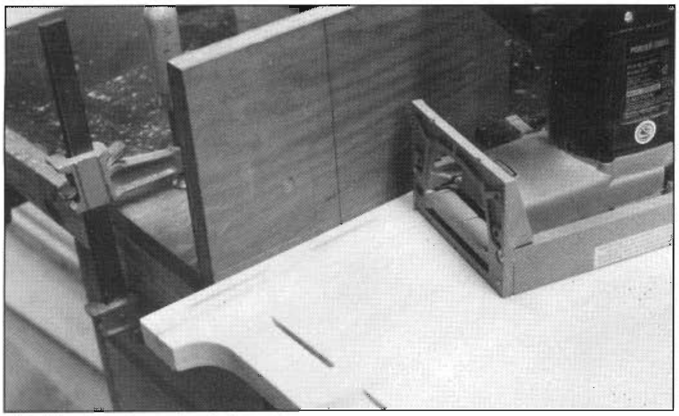
Clamp the base to the front panel at the point where its top edge will be when assembled. Mark for the biscuit centers, and make the cuts referencing the base of the tool against both pieces.

The easiest way I found to assemble the storage compartment was to attach the front panel to the base, then the back panel, and finally the lid support. Lay the front panel (G) face down on the workbench and mark a line running the length of the piece at 2 3/4" from the bottom edge. Now lay the base (C) with its best

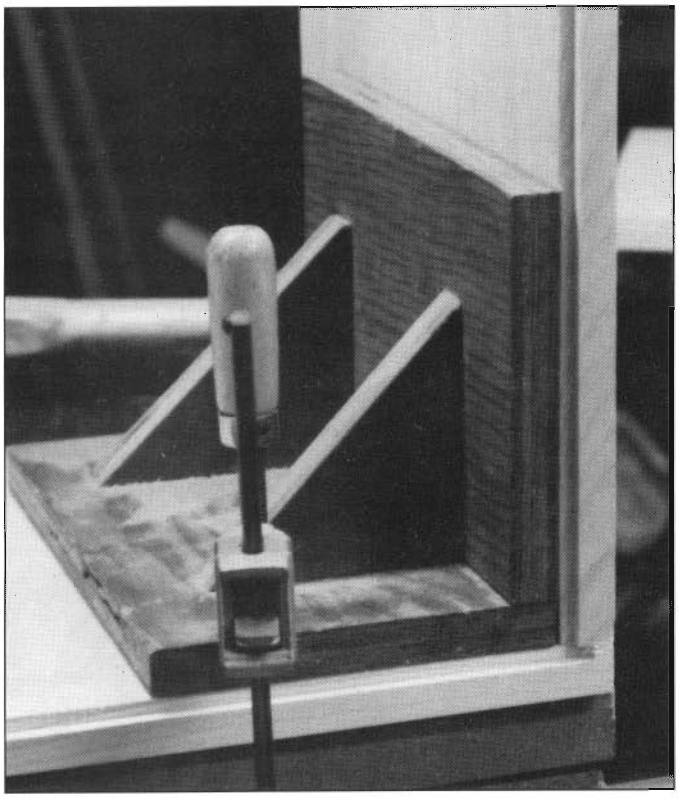
Figure 2. Orthographic Views



Tom Larson

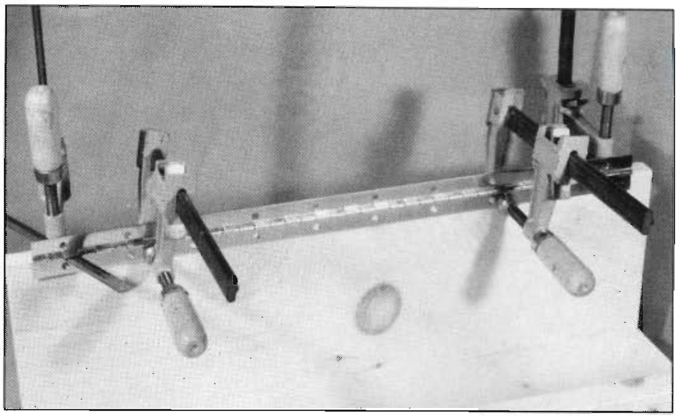

author

To cut the slots for joints that are flush on the outside, reference the base of the tool against a right angle jig clamped to the workbench.


You can also use the right angle jig to hold parts of the case at 90° while the biscuits swell and the glue sets.

surface down, on top of the front panel aligning its front edge with the mark you just made. Clamp the two pieces in place and mark the centers for three biscuit slots on both pieces. Cut the slots in the base by referencing the bottom of the biscuit joiner against the front panel, and cut the slots in the front panel by referencing the bottom of the tool against the edge of the base piece. Next, lay the compartment back (F) on the workbench with its rabbeted side down and clamp the base to it with the unslotted edge positioned 3/4" away from the bottom edge. Cut three slots as before; support the biscuit joiner when cutting the base slots by resting it on some scrap that is the same thickness as the compartment back.

Use the same procedure to cut the joints for the rest of the case. Locate the edge of an adjoining member, clamp it in place and cut slots at the same locations in both pieces. I used a different approach for joints that had to be flush at their outside surfaces. After marking the slot centers on both pieces, I'd cut the end grain slots by clamping the piece face down on the workbench and referencing the bottom of the tool on the bench itself. Then I clamped my right angle jig to the bench, lined up the slot mark on the mating piece with a reference mark on the jig, and referenced the base of the tool against the vertical surface of the jig.


Insert a hacksaw blade between the leaves of the hinge to help hold it in position as you drill for the holes.

Proceed with the installation of the piano hinge and compartment lid (D). Cut the hinge to 1" less than the compartment width and install it with temporary screws. An easy way to position this type of hinge is to insert a hacksaw blade in one of the spaces between the hinge body and the hinge pin. Clamp the saw blade to the top edge of the compartment back and then clamp the piano hinge in place. Making the lid (D) is a straightforward piece of work and begins by cutting it to length which is 1/4" less than the inside width of the cabinet. Next, rip a 5° angle on the front edge so the panel can drop nicely into position, even when the wood expands a bit. Test fit the unit with the piano hinge held in position with a few screws and make any adjustments at this time. Temporarily attach the lid support as shown in the instructions that come with it, and test the assembly to ensure that you are satisfied with the action of the entire assembly. Remove the lid and set it aside for installation after all the parts have been finished.

Begin assembly by putting together the front panel, base, and compartment back. It's best to do this one joint at a time, using the right angle jig to hold the pieces square while the biscuits swell and the glue sets.

Next, attach the storage compartment subassembly to one side and then attach the top to that same side before installing the second side.

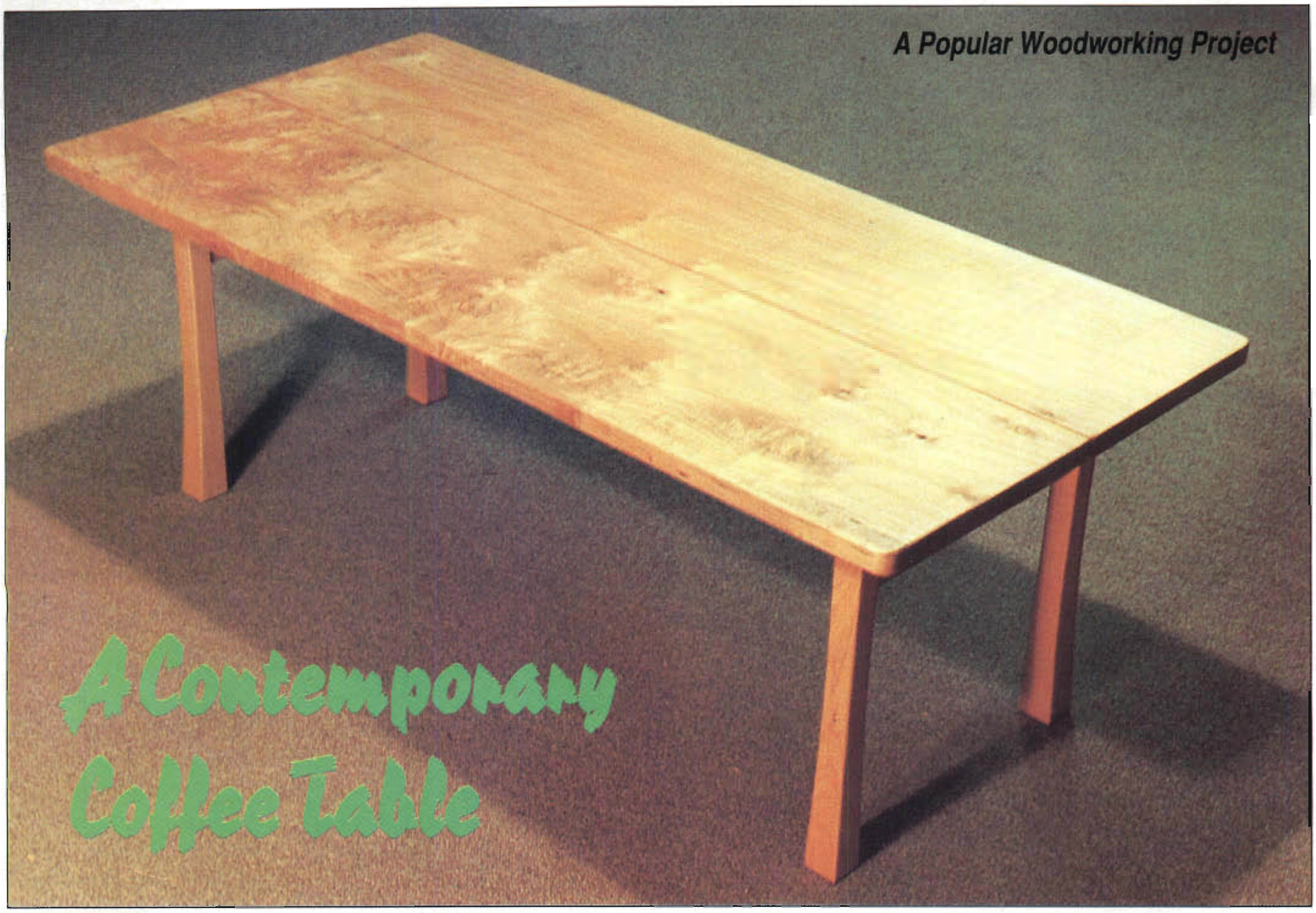
Cut the doors to fit with 1/16" clearance on all sides; tilt the blade 2° when you rip the edges.

Finish–sand the doors and prepare for the installation of the hinges, but do not install them until after the piece has been finished. Cut the back to fit the unit, and finish sand it, but do not install it right now.

Temporarily attach a pair of clothes rod support brackets and then measure and cut the clothes rod to fit the space available.

Finish all the pieces however you see fit; I used a satin varnish.

After the finish has cured, install the compartment lid with its handle, the doors with their Shaker style knobs, a pair of magnetic door catches at the top of the case, the clothes rod brackets with the rod, the drawer pull on the compartment face and finally, the unit back. A coat of paste wax completes this project that will be the center of attraction in any child's room. PW


A Popular Woodworking Project

A Contemporary Coffee Table

by Ken Sadler

When it comes to the design of a coffee table, the only element that all designs have in common is that they are low, usually between 16" and 18". Other than that, they vary all over the map—especially in shape and style. I feel that the lines of furniture should be simple and relatively plain so the wood itself provides the beauty in the piece. I also believe that when you make a piece of furniture, you expect to use it and pass it on to your children and possibly your grandchildren. You want it to fit into whatever decor you or they might have, now or in the future. The exotic pieces, after the fad has faded, usually end up in the attic or at Goodwill.

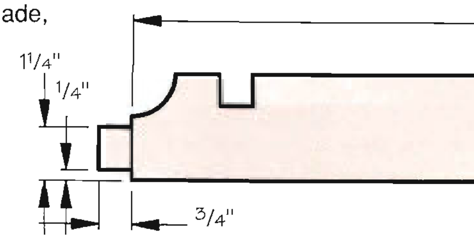
If you agree with this, I think you'll enjoy building this table. It's simple and easy to build, yet it has several interesting points that make it a bit different from the run of the mill. So, without more ado, let's get at it. We'll start with the base (see Figure 1).

Cut the legs (A) from rough 2 X 2 stock. Joint two adjacent faces of each, and be sure that these faces are square with each other. With the jointed faces against the fence, rip each leg to 1 1/2" square and cut them all to the finished length given in the Cutting List. Decide which end will be the top, and standing the legs upright with this end up, form them into a square with all jointed faces touching each other. Now, number the legs 1, 2, 3 and 4 in a clockwise direction starting with the right rear one. Also mark legs 1 and 2 to indicate the mating faces; do the same with 3 and 4. Legs 1 and 2 will be at one end and 3 and 4 will be those at the other end. This is very important because you will cut two difference mortises in each leg. If they are not properly placed, you will have ruined the leg. Don't do any shaping of the legs at this time; just set them aside for now.

Cut the stretchers (B), the long top supports (C), and the short top supports (D) to finished size. The lengths given in the Cutting List include the tenons on the stretchers and the long top supports (the short top supports have no tenons).

To cut the tenons (see Figure 2) set your table saw blade at 1/8" height and your rip fence at 3/4" to the outside of the blade and using your miter gauge, run the flat sides of both ends of both stretchers and supports through this setup. Now, raise the blade to 1/4" height and run both edges of the stretchers and the bottom edge of the supports through. Raise the blade to 1 1/4" and run the *top* edge of the supports through.

Now cut the cheeks of the tenons using a tenoning jig like the one shown on page 26. Set the blade height at just under 3/4" and the distance between the jig and the inner face of the blade at 1/2" for the stretchers and 5/8" for the supports. In this kind of a cut, always have the waste wood on the outside of the blade, never between the blade and the fence. Each piece will need four cuts with this setup. It is best to make the face cuts first and then the side cuts. For the side cuts, leave the blade height the same, and set the tenoning jig 1 3/4" from the inside face of the blade for all four cuts on the stretchers. On the top supports, set the jig at 2 1/4" for the

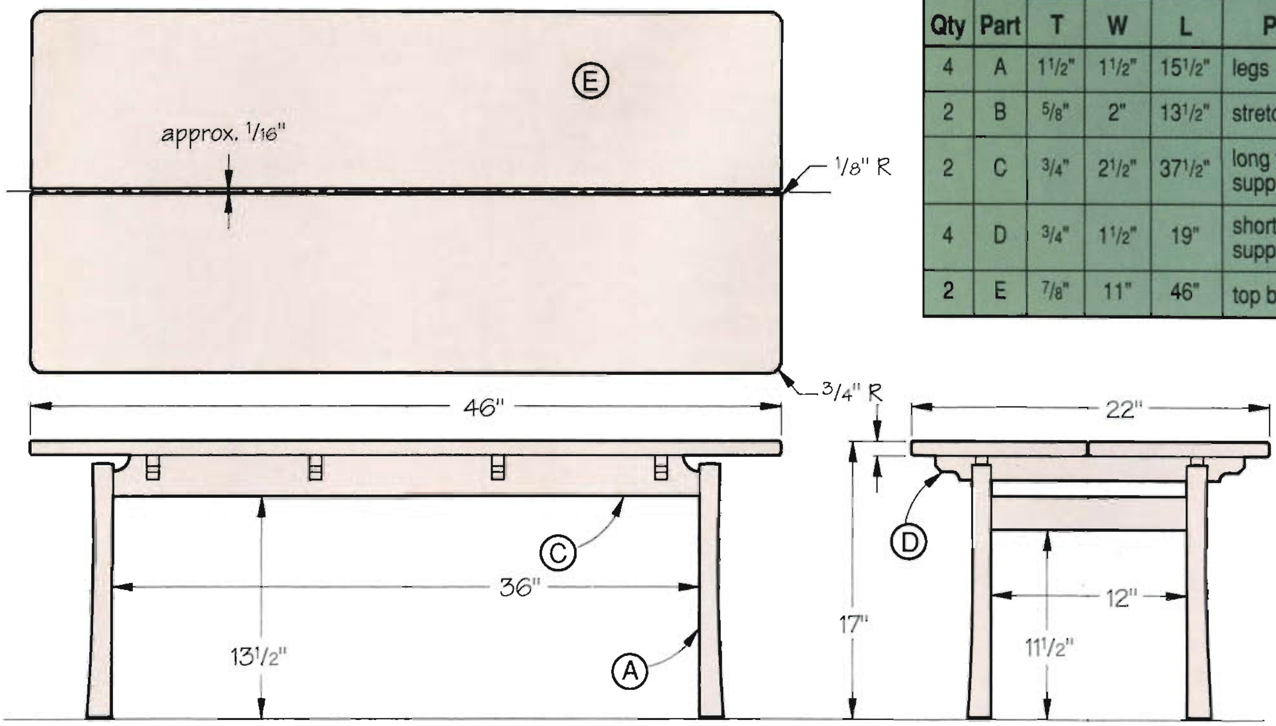


***Ken Sadler** is a retired custom furnituremaker in Portland, Oregon.*

Contemporary Coffee Table Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
4	A	1 1/2"	1 1/2"	15 1/2"	legs
2	B	5/8"	2"	13 1/2"	stretchers
2	C	3/4"	2 1/2"	37 1/2"	long top supports
4	D	3/4"	1 1/2"	19"	short top supports
2	E	7/8"	11"	46"	top boards

Illustrations by Tom Larson

Figure 1. Orthographic Views



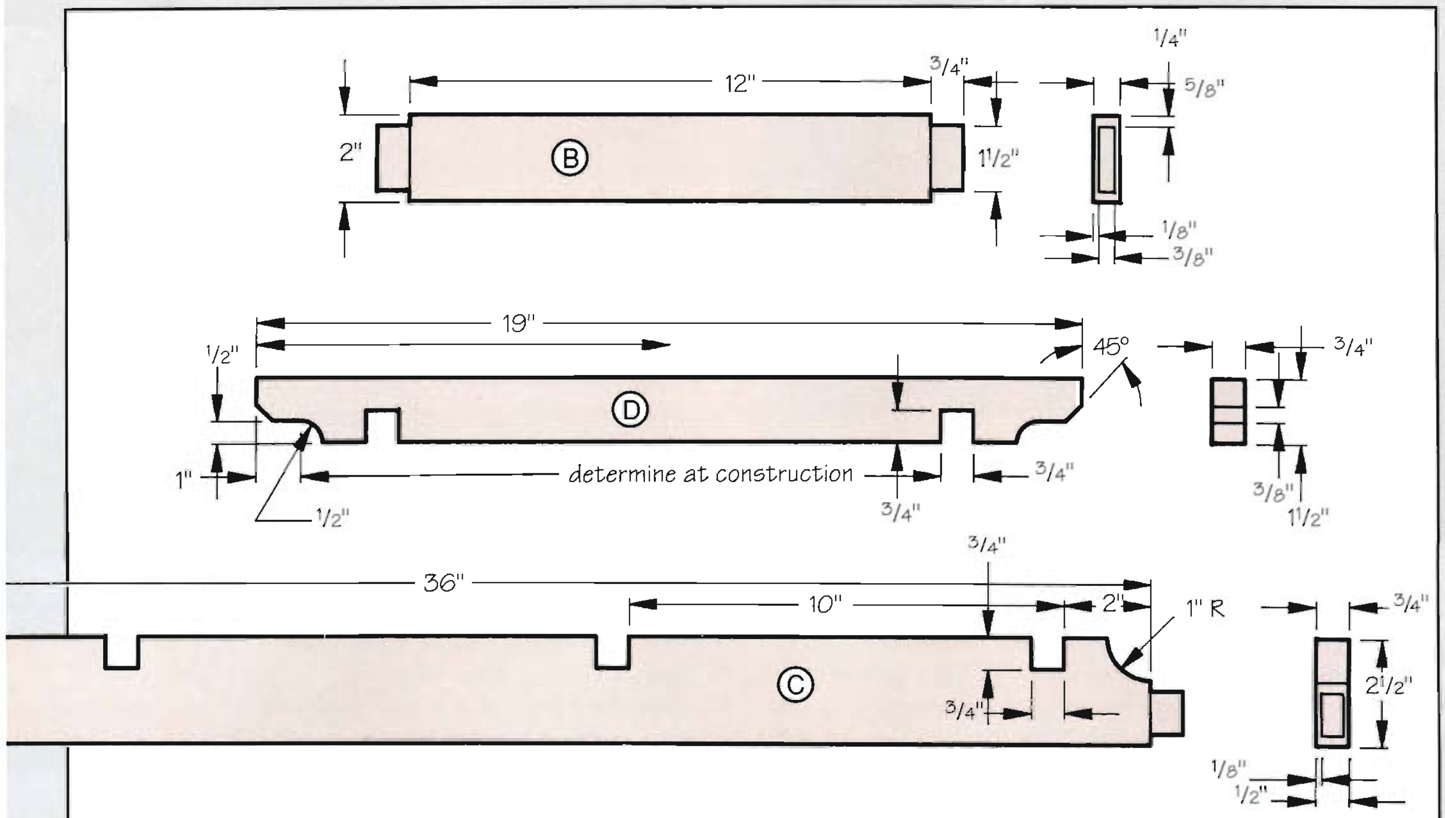


Figure 2. The Horizontal Members

bottom edge and 1¼" for the top edge.

Using the tenons you have just cut as templates, lay out the mortises on all four leg blanks, marking them with a sharp knife. Again be careful to get each mortise in its correct position as shown in Figure 3. There is only one straight corner on each leg; all the mortises—whatever their position vertically—should be ⅜" *from this* corner. I have found that the easiest way to cut blind mortises is to drill out most of the waste wood and then pare the sides to the line with a sharp chisel. Also, I cut the mortise slightly deeper than the length of the tenon. This makes for a better fit, and allows the shoulder to seat firmly. The tenons should fit the mortises snugly but not tightly; too tight a fit wipes most of the glue out of the joint.

At this point you should finish work on the long top supports (C), cutting the curves at the ends and the notches as shown in Figure 2. Now dry–assemble the legs, stretchers, and long top supports; clamp them together gently but firmly and make sure everything is square. Carefully measure the distance between the long top supports. This will be the distance between the notches on the short top supports (D). You will note that in Figure 2 this dimension is marked "determine at construction." No matter how careful the craftsman may be, there are usually slight differences between the drawing dimensions and the actual dimensions on the piece. Therefore, on a critical dimension such as this it is best to set it based on the actual dimension. Having obtained this distance, cut the notches in the short top supports, and assemble them with the rest of the base to see that they fit properly. Take the base apart and round all four edges of the stretchers and the bottom edges of the top supports, as well as the edges of all the curved sections. Do the final sanding of these parts at this time.

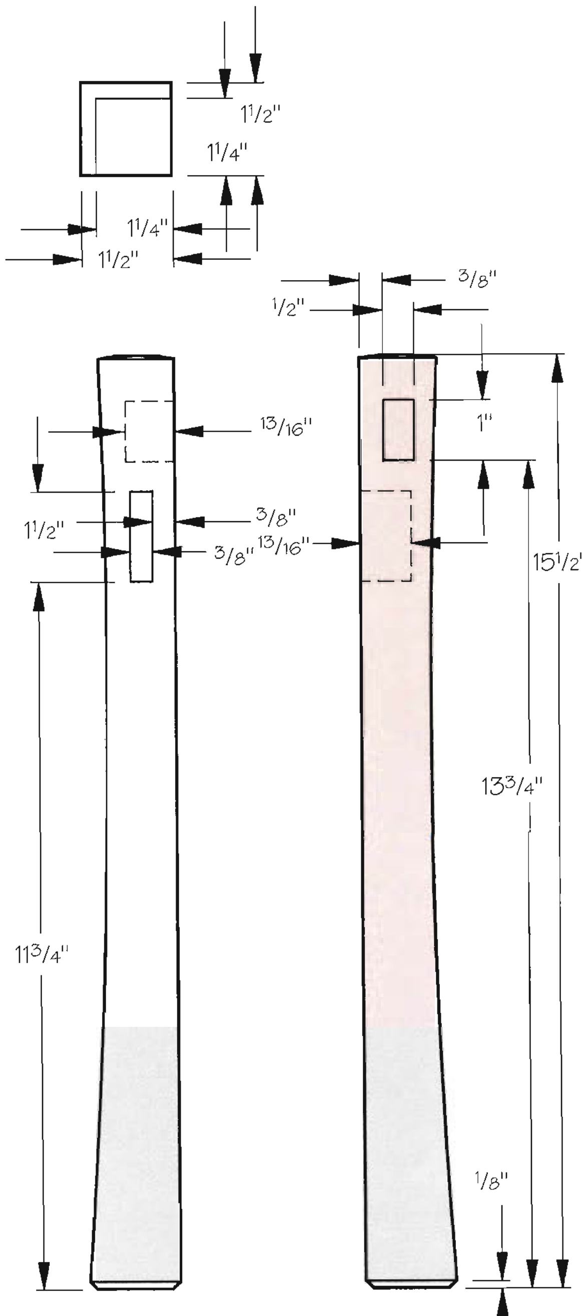
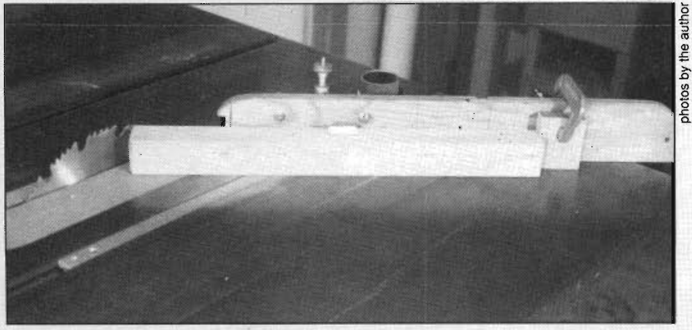


Figure 3. The Legs

Tom Larson

Clamp a stop to the miter gauge so you can precisely chamfer the bottoms of the legs.



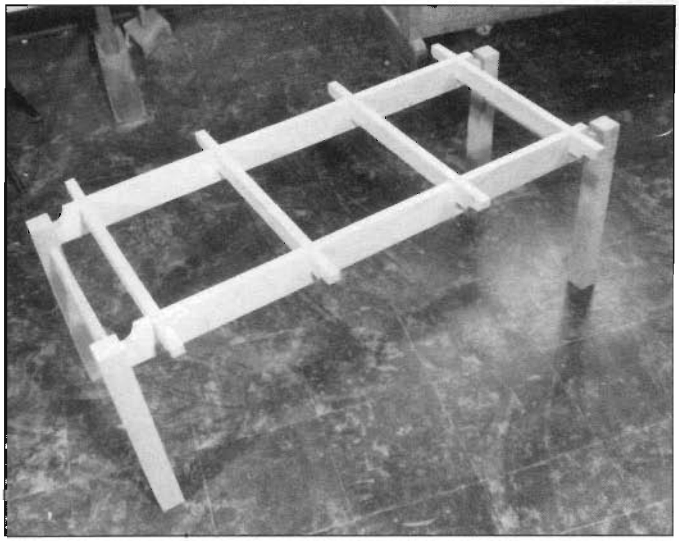
photos by the author

At last it's time to shape the legs. First, cut the small chamfers at the bottom of the legs. Set this up as shown in the photo, with the miter gauge at 45° and a stop to position the leg correctly. Make the four cuts on each leg.

Make a full–size template from the pattern in the PullOut™ Plans section of the magazine. Trace this on one of the rough faces of the leg (a face without mortises), and band saw to the curve. Now place the template on the newly sawn surface, trace it and saw to this curve. Save several of the waste pieces; they will be very helpful in holding the legs in the vise while you work on them.

Smooth the sawn surfaces. The fastest and easiest way is with a spokeshave. If you don't have this tool you'll have to use a file, followed by 50– then 80–grit sand paper. My advice is to get yourself a spokeshave. They're not expensive, and they're a very handy tool. The next step is to slightly round all the edges. This, too, will proceed much faster with a spokeshave. At this time you should also round off the tops of the legs as shown in Figure 3. As a last step, sand all over with 150–grit paper. Be careful not to alter the flatness of the surface around the stretcher mortises.

Dry–assemble the finished parts again to make sure everything fits as it should. Take it apart and apply the glue. I suggest you glue the legs and the stretchers first, as two separate assemblies. Make sure the legs are square with the stretchers. Here again is where the curved waste pieces you cut from the legs come in handy. They make perfect pads under the clamps. While these are drying, assemble the top supports, and glue them together. Make sure the assembly is square. When all the subassemblies have dried, assemble the two ends to the top

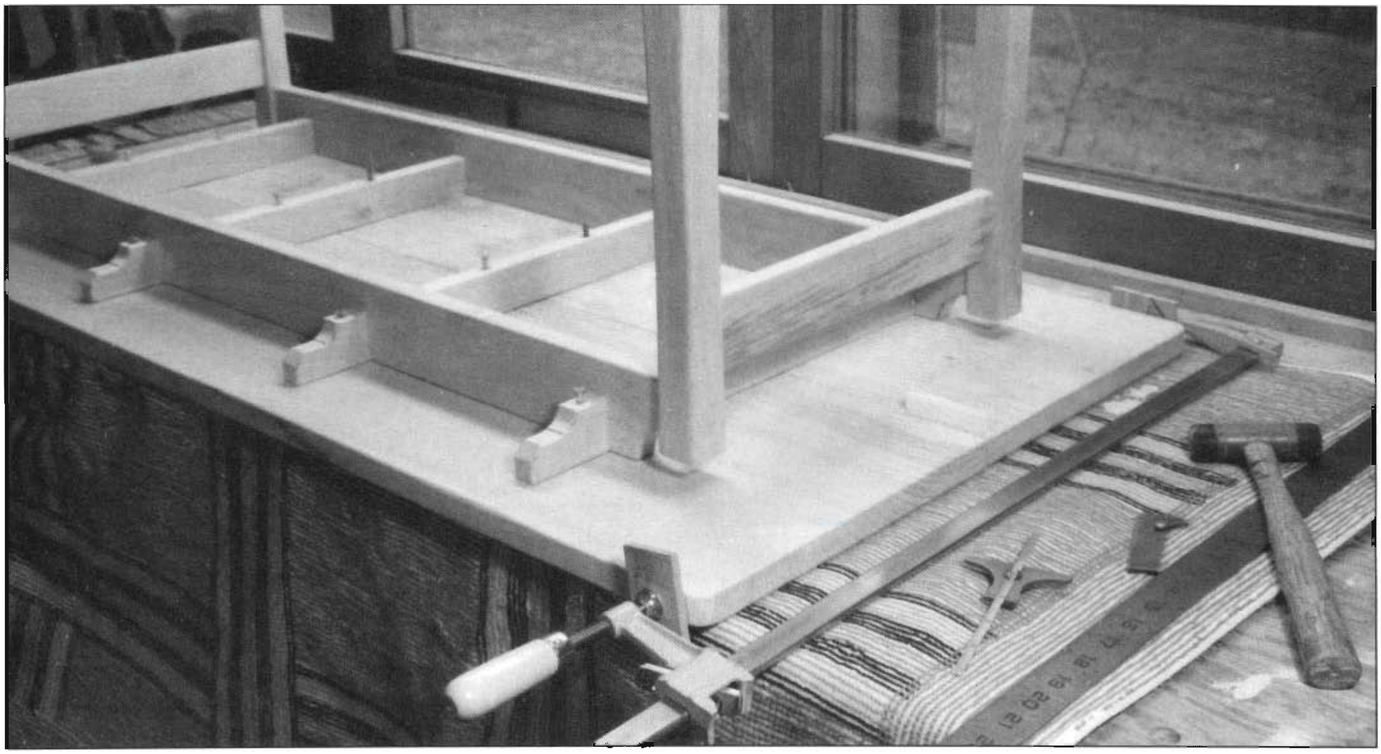


Dry–assemble the base. When you glue it, do the legs and aprons as separate subassemblies; then add the support subassembly.

conditions will be slight, so the mounting screws can be in holes rather than slots. I have made the thickness of the top 7/8" because the extra fullness looks better than 3/4". However, you'll have to get 1" rough stock (and a full 1" at that) in order to finish at 7/8". If you can't get the rough stock then you'll have to settle for 3/4" finished thickness, which will look okay.

Here is another way to get a very striking top. It will take time and searching, but if you can find the right piece it will be worth it. Look for a piece at least 2" thick by 12" wide and any length over 48" that has a distinctive grain pattern. Joint both edges straight and then resaw it down the middle. Lay it open like a book and you have a book match. By the time you have the pieces flat and smooth, you may not be able to hold the thickness to 7/8", but with the beauty and uniqueness of such a top, it will not matter. If you find the board, but don't have the resaw capacity in your own shop, find a commercial shop in your town that does and take it to them. They won't charge you much for doing it, and it will be worth the price to get such a nice top.

Clamp the top boards together upside down with a folded file card between them to set the proper gap. Center the base assembly, and attach the top with screws.



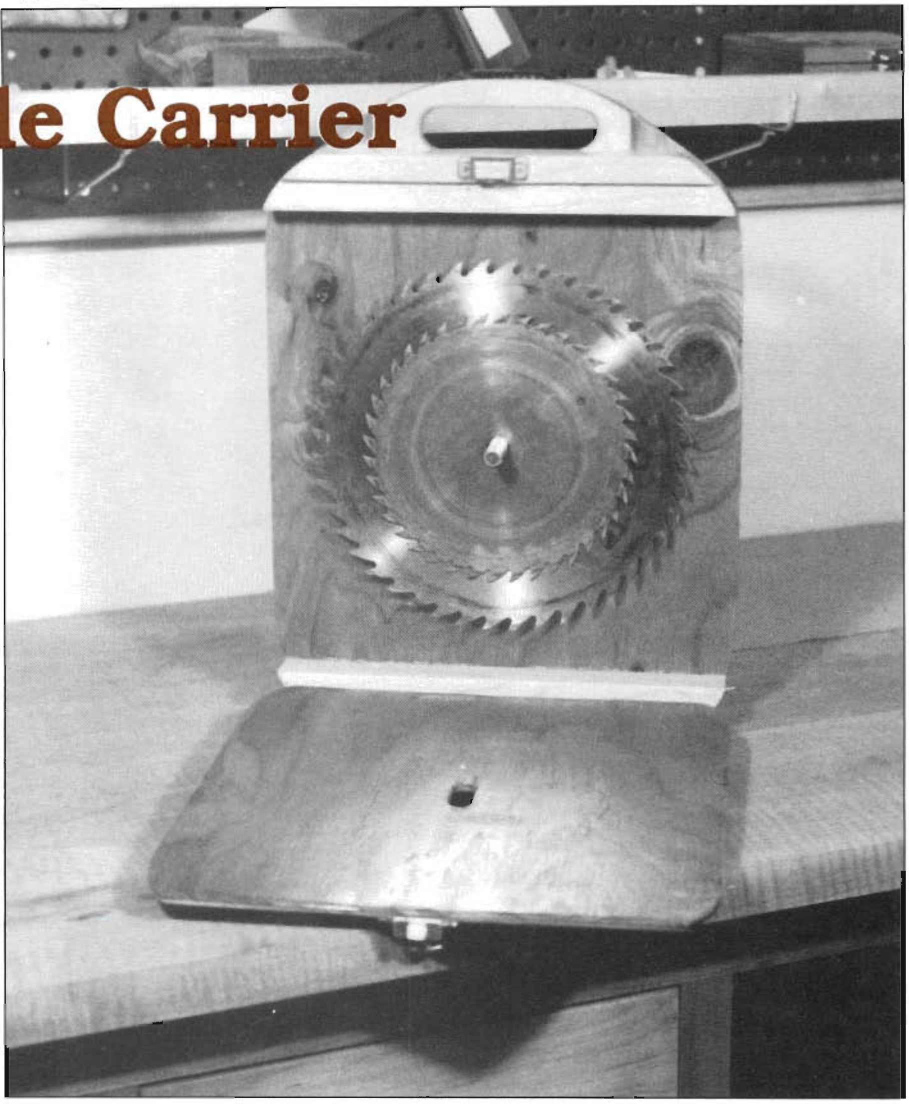
support frame. Clamp them securely, and be sure that the legs are square with the supports.

Last—but really the most important—is the top (E). It's important because it will set the tone of the whole piece. It will be *seen* while the base will merely be *noticed.* It should be made from wood that has a distinct and interesting grain pattern. Notice that it's two separate boards, each approximately 11" wide, with a slight space between them and all the edges of each board slightly rounded. If you're lucky, by searching through the stack at the lumberyard, you may find two 1 X 12 boards that will do the job. Otherwise you will have to try to get matching pieces and glue them up. However, it's easier to find two pieces to match to make one board than it is to find four to match to make the top solid. There is another advantage to this design. Because the boards are relatively narrow, any movement due to changing climate

When mounting the top, put the boards upside down on the bench with a 1/16" shim between them at each end (I used a 3 X 5 file card folded twice) and clamp them together (tighten the clamp just enough to prevent any movement.) Drill pilot holes and drive screws through the supports and into the top.

For the finishing operation, I removed the top boards and finished them and the base separately; it's much easier that way. (When reinstalling the boards, put the shims in place until the boards are screwed down.) I use Formby's Tung Oil Finish (low gloss). Apply it with a brush and let it soak in for several minutes; then wipe all the excess away. Apply as many coats as it takes to get the amount of gloss you want. I've found that it's best to apply the first coat generously and subsequent coats sparingly. Otherwise you waste too much and the stuff is expensive. PW

A Saw Blade Carrier



by Devore O. Burch

For many years my wife carried my dull saw blades to the sharpening shop and picked them up afterwards. This was a tedious task and, as she said, it was like carrying a live porcupine. This blade carrier not only provides a safe and handy method for carrying blades, it's also a good place for storage.

The construction of it is relatively simple and, other than glue up time, shouldn't take too long. Using 1/4" plywood, cut out the front (A) and the back (B) panels to the dimensions on the Cutting List.

Then, using a scrap of 2 X 4 or whatever you have around the shop, cut the end pieces (C) and the handle (D) to rough size. Set up your table saw or router and, referring to Figure 1, make the 1/4" deep by 3/4" wide rabbet on each end piece.

There's a plywood doubler (E) on the back panel to help support the center post. After you cut this to size you can round the corners and glue and screw it to the outside of the back panel as is indicated in the illustration to the right.

The next step is to glue and nail the handle and the end pieces to the back panel (see illustration) and let them dry. When you're ready, attach the front panel to the ends with the two flap hinges and cupboard latch hardware (see illustration).

Carol Law

Using the full-size pattern in the Pull-out™ Plans section, mark and cut out the handle and the overall shape of the blade carrier. Also mark and drill a 1/2" hole for the center post at this time. On the front panel use the hole as a reference point, and elongate and broaden it so it easily clears the 1/2" x 2 1/2" carriage bolt used for the center post.

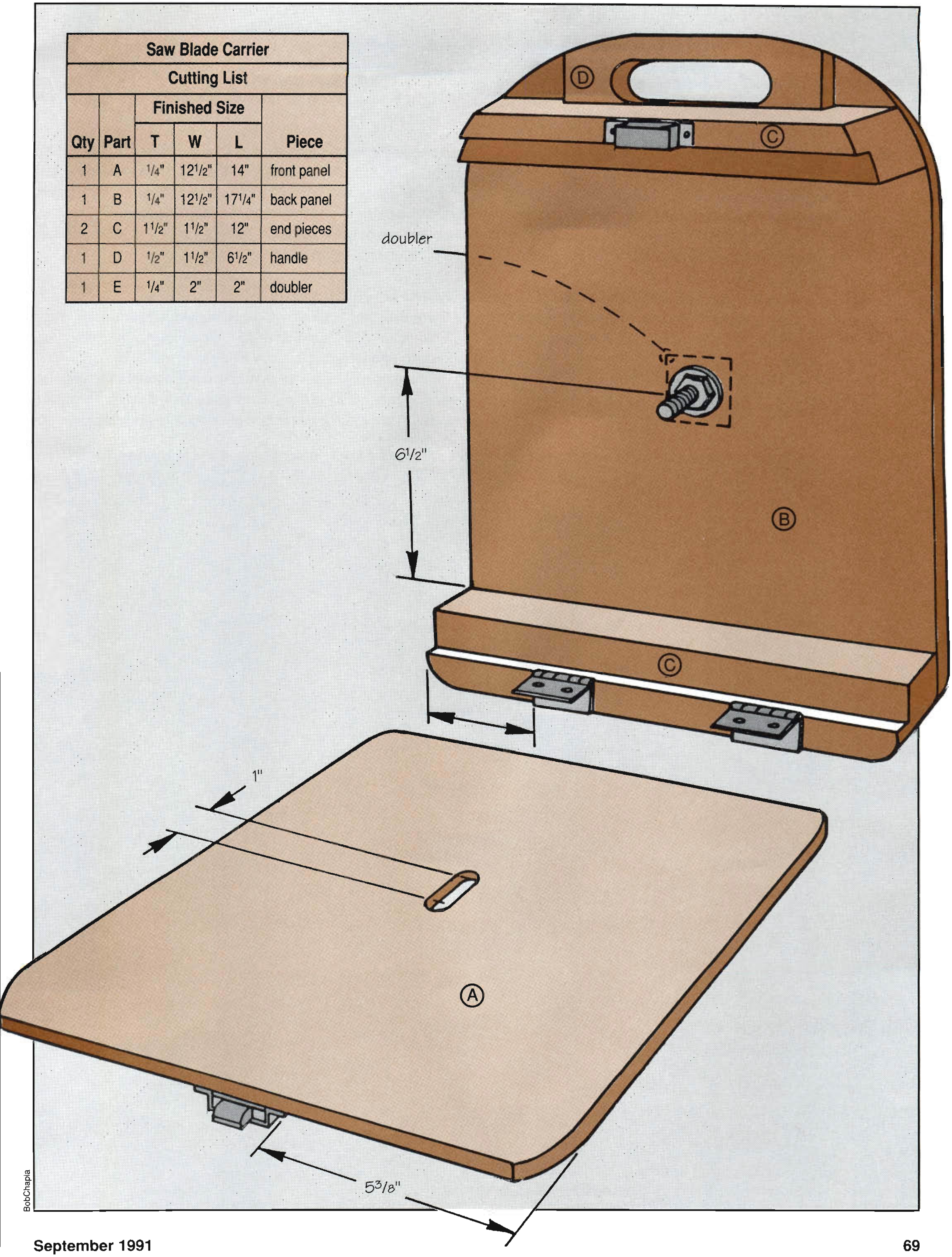
After a bit of sanding and a couple of coats of lacquer, it's ready to go. The carrier has also turned out to be a good place to store the dull blades and to leave myself a note about other tools and bits I need to have sharpened. I'm happy and my wife is even happier—that's what I call a perfect project. PW

***Devore O. Burch** is a woodworker in Fort Worth, Texas, and a frequent contributor to* Popular Woodworking.

Saw Blade Carrier

Cutting List

		Finished Size			
Qty	Part	T	W	L	Piece
1	A	1/4"	12 1/2"	14"	front panel
1	B	1/4"	12 1/2"	17 1/4"	back panel
2	C	1 1/2"	1 1/2"	12"	end pieces
1	D	1/2"	1 1/2"	6 1/2"	handle
1	E	1/4"	2"	2"	doubler



BobChapia

Split-Ring Bowls Revisited

by B. William Bigelow

I started using the split–ring technique for making bowl blanks years ago to economize on wood supplies. Using this method, it is possible to make a twelve–inch diameter bowl from just one board foot of stock. Even a bowl with a lid and a knob can be made from less than two board feet. Scraps from other projects can provide the material for these bowls.

The idea behind this technique is to make up bowl blanks using half–rings cut from two boards (I refer to them as ring boards). Glue the halves together, and eventually stack the rings to form a hollow bowl shape.

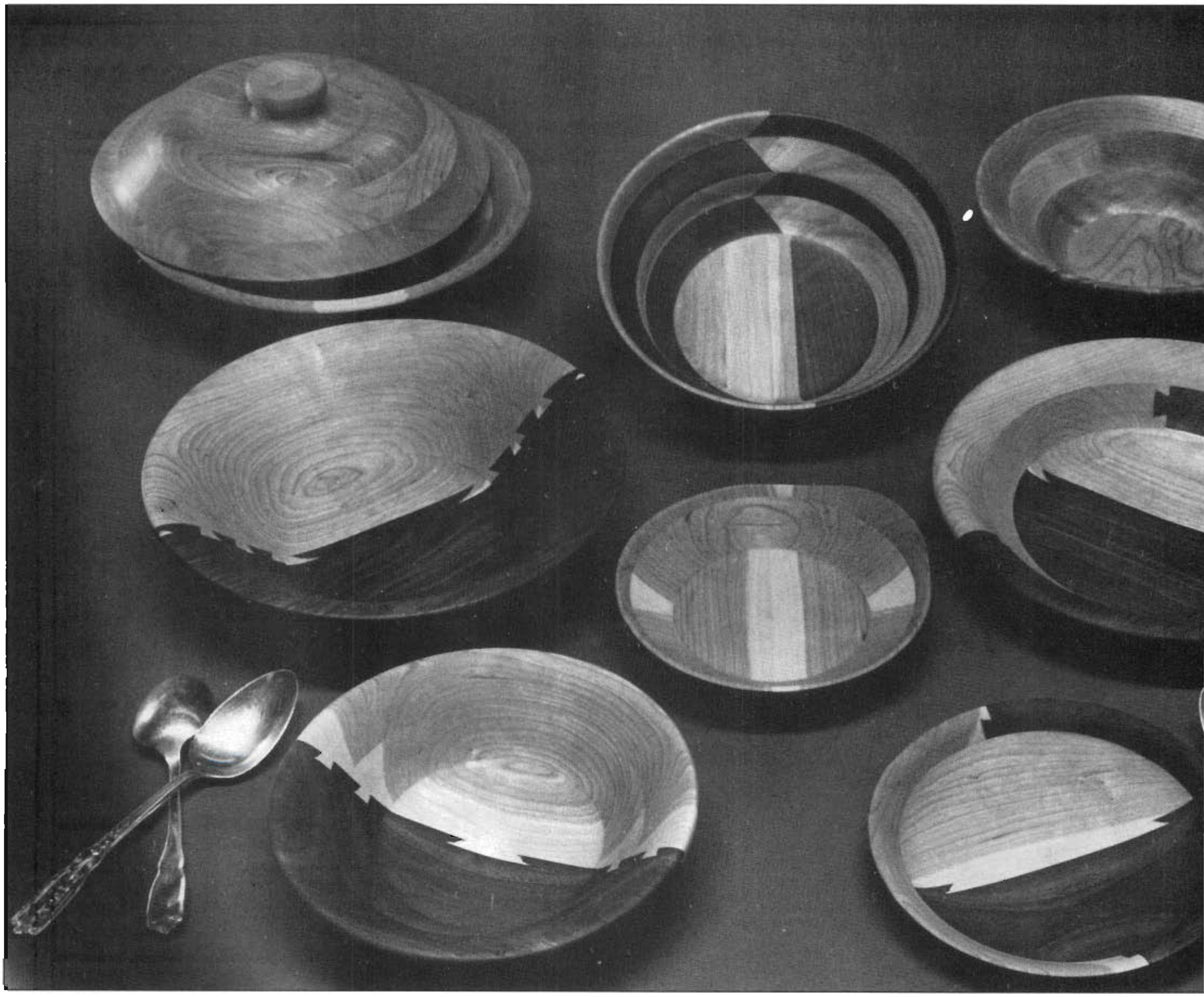
The glued bowl blank is hollow and fast to turn, more than compensating for the time it takes to cut and glue the rings. No doubt the bowl blank is somewhat limiting. It has straight sides that splay out at 45° from a flat bottom, but these limitations are overcome by cutting to the limits of shape. Although the walls of the blank are only 3/4" thick, graceful cyma curves, rims and feet are possible as shown in Figure 1.

Recent Developments

I wrote an article about using this technique several years ago in *PW* (Issue #26, Aug/Sep 1985). Since then, I've refined my approach and developed some interesting variations.

In the past, my ring boards were made of the same material, their edges trimmed straight and square on the jointer to make a good butt joint when it was time to glue the half–rings together. An

***B. William Bigelow** is an industrial arts teacher in Surry, New Hampshire.*



obvious variation on this approach would be to use different materials for the ring boards. By cutting the rings from two ring boards of different woods, the half–rings will be different colors. The full rings can then be rotated and stacked in different configurations. Some bowls can have a checkerboard effect if stacked just so. To carry this idea a step further, make up the ring boards themselves from narrower pieces of contrasting material laminated together.

Another whole world of possibilities opens up when you consider using different joints for splicing together the half–rings, or for joining the laminations as you make up the ring boards.

Cut the joint between the two ring boards before cutting out the half–rings. Each ring layer will reflect that joint in the finished bowl. The simple butt joint, strong enough, draws straight lines alternately down the bowl. Scarf joints slash the bowl with diagonal lines. Tongue and groove, sliding dovetail, and even a glue joint cutter all add pattern with little effort.

A recent find of mine has been the multiple dovetail pattern. Each of the ring boards is made with three or more sliding dovetail sections of contrasting wood. The joint between the ring boards is also a sliding dovetail. The end result is a multiple dovetail pattern in each ring.

In the bottom of the bowl, you'll discover an interesting effect made by cutting half way through the bottom sliding dovetail. If this dovetail pattern is cut in the bottom of the bowl and repeated on the underside, friends will forever wonder how the bowl was glued up.

Making the Blank

Choose two 3/4" boards and lay them side by side on the workbench. They must be the same thickness but may be different species of wood. The two boards together should comprise a square that will be the diameter of the finished bowl. Now prepare a good glue joint between the boards. Use a butt joint at first, then later try the scarf joint, or the sliding dovetail joint.

Tape the boards together, locate the center and draw the largest circle possible in the blank. Now draw smaller circles around the same center, decreasing the radius 3/4" each time until you have two or three rings 3/4" apart around the bottom.

Separate the ring boards and cut the rings out on the band saw. Cut the outside ring with the table 90° to the blade; then cut the rest of the rings with the band saw table tilted to 45°. Cutting accurate arcs with the table at 45° takes a little practice, but before long, you'll be an expert. Stand on the downward side of the table during the cut. Stay on the line because you need a thick–walled bowl to shape later.

Glue all the half–rings together. Gentle pressure from a clamp, or even hand pressure will do the trick. Be sure to keep the half–rings aligned properly. Yellow carpenters' glue is excellent for the task. Set them aside for a few hours.

Next, sand any glue ridge or misalignment off the rings. Stack

photos by Deborah Porter

I make up my ring boards from several narrower pieces joined with sliding dovetails. I mill all the boards of one color with the dovetail groove

and all the contrasting boards with the dovetail tongue. If you don't have a Joint–Matic®, you can use a router table.

Glue the pieces that make up the separate ring boards, but don't glue the joint between the ring boards.

Clean up any excess glue, and plane the ring boards true.

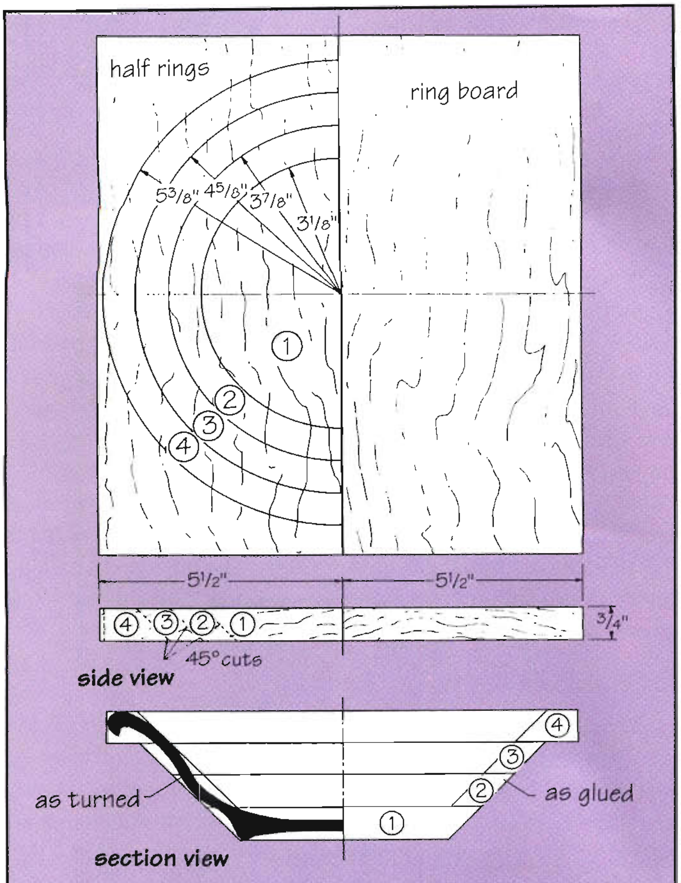


Figure 1. A Three Ring Bowl

illustrations by John A. Nelson

the rings upside down and check the contact areas between the rings. Rotate the rings so the glue joints are staggered and the best grain pattern appears. Mark down the stack with a pencil, so they can be restacked the same way. When you're satisfied, glue the rings together and clamp the stack down to the table, being careful to keep the rings centered.

Turning the Bowl

From here the bowl blank may be carved, fluted, sanded, sandblasted, or turned on the lathe. Since my bowl blanks are eventually turned on the lathe, when I glue up the ring stack, I glue a plywood disk to the bowl blank with paper in between. After the assembly is dried, I mount the faceplate with short drywall screws using a cordless screwdriver (I redrilled the faceplate with smaller holes to accept drywall screws). The paper glued between the plywood disk and the bowl will allow easy parting when it's time to turn the bottom.

It is critical the bowl be centered on the faceplate. Any *measure off center* will double itself as the bowl rotates. After unsuccessfully experimenting with elaborate jigs to center the faceplate, I adopted the "guess-and-try" method. Here's how it works: Guess at the center, and attach the faceplate with two screws. Pencil a line around the faceplate onto the plywood disk. Mount the bowl on the lathe, and with the power off, rotate it by hand and mark the high and low spots by holding a pencil on the tool rest. Note the difference between the high and low spots; then move the face plate *half* the difference toward the high side. Reattach it with all four screws, and the bowl will be centered.

I shape the outside with a gouge, then switch to a round–nose

Slide the ring boards together, and draw concentric circles at 3/4" intervals.

Separate the boards to cut out the ring segments.

Band saw the outside of the bowl at 90°. This will give you extra material for turning a nice rim.

Tilt the band saw table to 45° to cut out the rest of the ring segments.

Now glue the center joint connecting the half–rings.

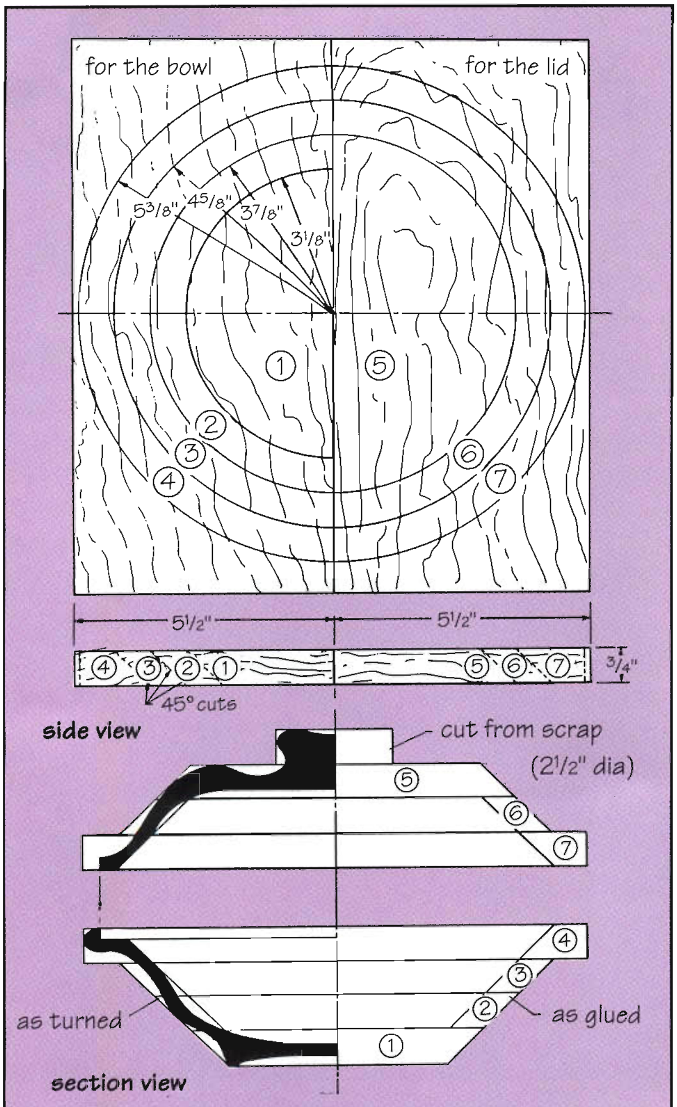
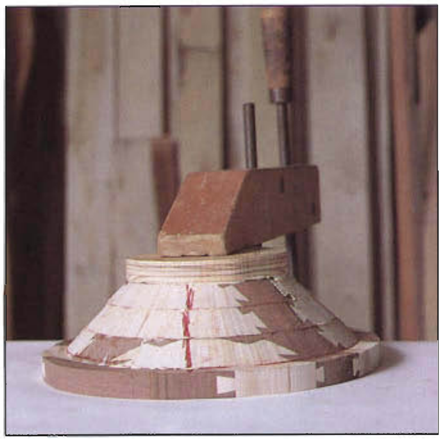
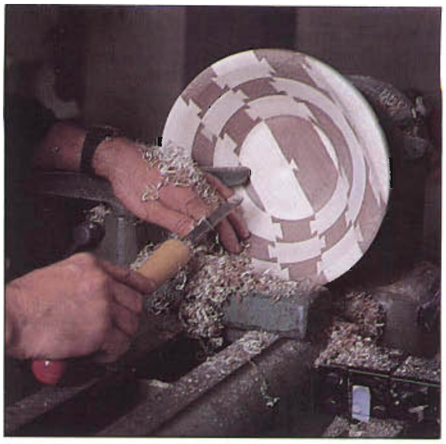


Figure 2. A Lidded Bowl

photos by Deborah Porter



Stack the rings in the way that best shows off the pattern. Glue on the plywood for the faceplate when you glue up the stack.



I turn the inside of the bowl with a round–nose scraper.

If you cut partway into the bottom, you expose the sliding dovetail, creating an interesting pattern.

When all other turning is done, I remove the faceplate and tape the bowl to a plywood disk on the outboard side of the lathe.

I lightly turn a recess in the bottom to expose the dovetail, and so the bowl will sit level.

scraper for inside work. I grind the scraper leaving the burr on. I hold the handle of the tool slightly above center and the tool tip below center as I work. Thus the burr will shave the wood, keeping end grain tearing and subsequent sanding to a minimum. When the burr wears, I touch it up on a waterstone several times before regrinding the tool.

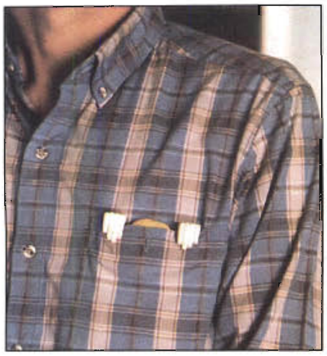
The last stage in the turning process is to cut a recess in the bottom so the bowl will sit flat. For this I have a large reusable plywood disk which I mount to the outboard side of the lathe. After turning the disk, I draw a series of concentric circles using a dark pencil while the plywood is spinning. I apply some double–faced tape to the disk and center the bowl within the circles (the dark lines show through the tape). The downturned rim provides an adequate surface area for tape adhesion, but even so, I cut gently with my hand on the bowl.

Making a Lid

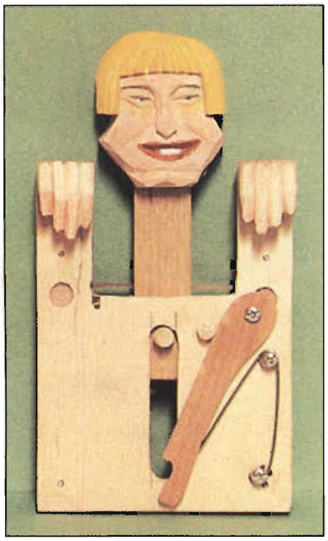
To make a lidded bowl I cut a rabbet inside the rim as shown in Figure 2 and leave the bowl attached to the faceplate. I glue up a two–ring blank for the lid, and mount it on another faceplate to turn its inside and to fit it to the rabbet in the bowl.

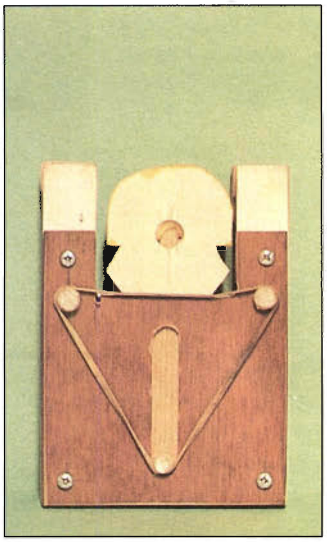
Then I mount the bowl on the lathe again, part the lid from its faceplate and tape it in place on the bowl. Now it is possible to turn the knob. You can make a small, recessed knob in the lid bottom, or you can glue on a piece of scrap from the corner of a ring board when you glue up the lid blank. After you've perfected the lid, remove the bowl, and tape it to the outboard disk to cut the recess in the bottom as before.

Once you master this technique, you'll be amazed at how quickly—and cheaply—you can make beautiful bowls. PW



Pocket People



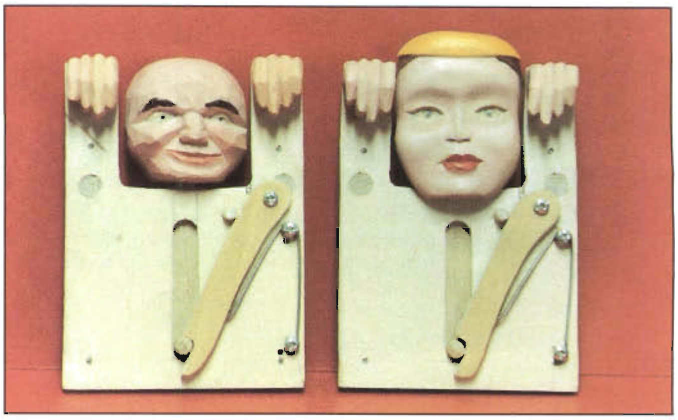


by Bob Jones

This little gizmo will amuse and amaze anyone you "spring" it on. When they see these tiny fingers clutching the rim of your shirt pocket, natural curiosity will prompt someone to ask, "What's that?" You press the latch through the fabric of your shirt and up pops the little head. While it may not be Earth–shattering, most people get a kick out of it and want to see it work several times. Then they want to see the mechanism and know how it works; I am always glad to show them.

To make my pocket people, I cut the body (A) from 1/4" Baltic birch plywood and the back (B) from scrap plastic laminate. You can substitute other materials, but these work best for making a thin, yet strong mechanism. Tape the two pieces together, and drill 5/16" holes at the "shoulders" and at the top and bottom of the slot as shown in the illustration. Drill four pilot holes through the back and into the body for the #4 X 3/8" pan head screws that attach the back. Install the screws and file off any portion that protrudes through the front of the body. Use a scroll saw to cut out the rest of the slot and to cut out the area for the head. Now separate the pieces and drill a 3/16" hole for the latch stop (C) and cut a 3/4" wide X 1/8" deep groove for the slide (D).

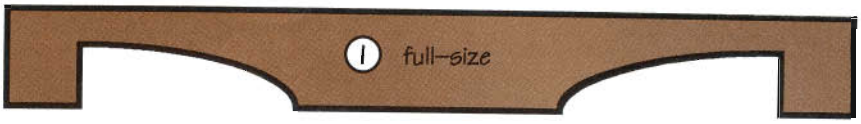
***Bob Jones** is a woodcarver in Fresno, California.*

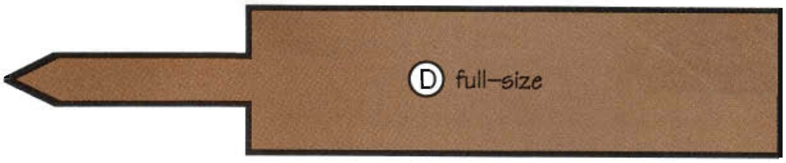


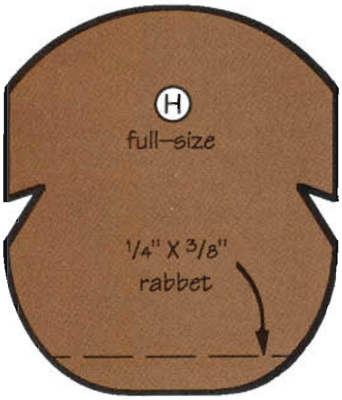
Pocket Person

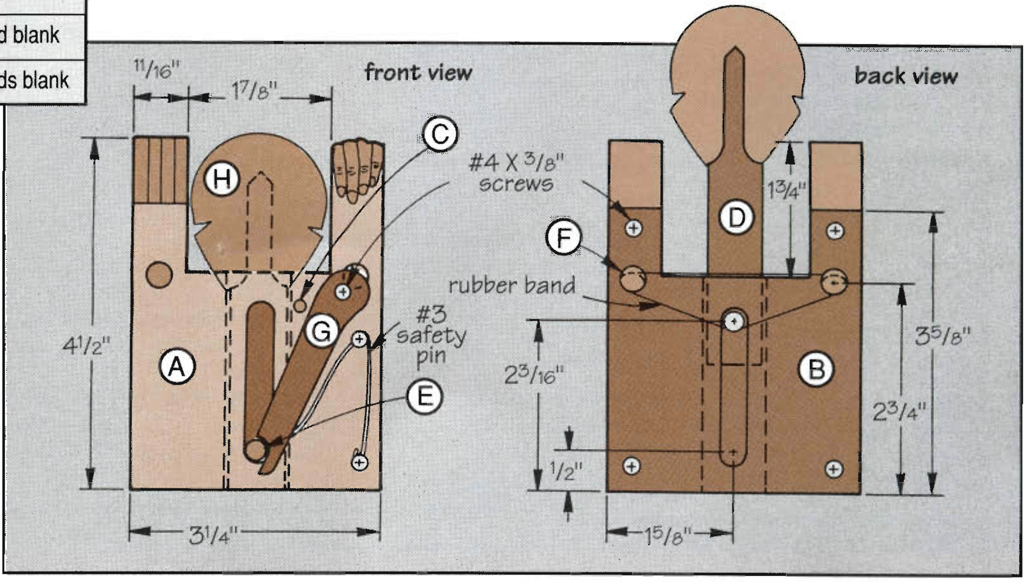
Cutting List

		Finished Size			
Qty	Part	T	W	L	Piece
1	A	1/4"	3 1/4"	4 1/2"	body
1	B	3/32"	3 1/4"	3 5/8"	back
1	C	1/4" diameter		7/16"	latch stop
1	D	1/8"	3/4"	4 1/8"	slide
1	E	1/4" diameter		5/8"	slide pin
2	F	5/16" diameter		1/2"	posts
1	G	1/8"	3/4"	3"	latch blank
1	H	5/8"	1 3/4"	2"	head blank
1	I	1/2"	9/16"	4 1/2"	hands blank





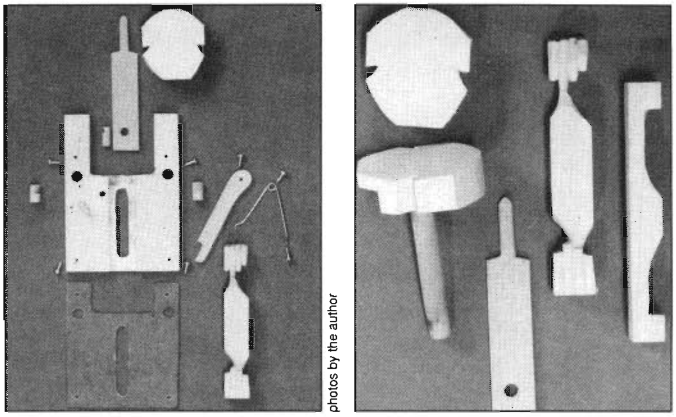




Cut the slide from the edge of a piece of hardwood, shape it as shown in the illustration, and sand it so it will easily slide in the groove in the body. Drill a 1/4" hole near the bottom end of the slide to accept the slide pin (E). Make the slide pin by notching a piece of 1/4" dowel stock to catch the rubber band; then cut it to length (make the posts (F) the same way, using 5/16" dowel stock). Glue the slide pin so that it protrudes through the back of the slide enough to catch the rubber band and through the front enough to catch the latch (G).

I made the latch from a door skin—some thin plywood salvaged from a discarded hollow core door. Cut it to the shape shown in the illustration and drill an oversized hole so it will pivot on its screw. Carve a thin groove on the back edge of the latch to retain the latch spring (a 1 1/2" safety pin). Make the latch spring by cutting off the head of the safety pin and bending it as shown. Use two more #4 X 3/8" pan head screws to mount the spring to the body. Glue the latch stop (C) in place, and glue in the posts (F) so they are flush to the front of the body with the notched ends sticking out the other side—notches up. Fit the slide in its groove, install the back and loop a rubber band around the posts and the slide pin. Test out the mechanism, and make any necessary adjustments.

Left: Except for a little more carving on the hands and head, all the pieces are ready to assemble. Right: Note the side view of a rough hand blank and the dowel handle in the head blank.


photos by the author

Cut the head blank (H) to size and drill a 1/4" hole about 1 1/8" deep into the bottom end to fit over the end of the slide. I also drill a hole partway into the back of the head so I can insert a dowel to serve as a handle while I carve. Cut a 1/4" wide X 3/8" deep rabbet on the back of the blank at the bottom, so the "chin" will fit over the mechanism. Scroll saw the head to rough shape, and carve and/or paint the face.

The hands are sort of "L"–shaped in cross section; I make the blank for the hands (I) as shown at left so that I have something to hang onto until the last minute. Glue them in place on the mechanism, and glue the head onto the slide. Now slip the little fellow into your shirt pocket, and introduce him to your friends. PW

Calendar

Events of Interest to Woodworkers

If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in *Calendar* free of charge.

California

Build A 10-Ft. Nova Scotia Skiff (8/3-10)
Location: Hyde Street Pier
Contact: National Maritime Museum Association., Bldg. 275, Crissy Field, San Francisco, CA 94129. 415-929-0202

Lumber Drying Workshop (8/5-9)
Location: UC Forest Products Lab, 1301 S. 46th St., Richmond, CA 94804. 415-231-9487

Duck Decoy Exhibition (8/31-10/27)
Location: San Francisco Craft & Folk Art Museum, Fort Mason, San Francisco, CA 94123-1382. 415-775-0990

Harvest Festival 1991 Craft Shows
Dates & Locations: Long Beach Convention Center (8/31, 9/1-2), Fresno Convention Center (9/13-15), Riverside Convention Center at Raincross Square (9/20-22), Ventura County Fairgrounds (9/27-29), Sacramento Community Center (10/4-6)

Huntington Beach Carvers (9/7-8)
Location: City Shopping Cntr., Orange, CA
Contact: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. 805-927-4718

Tri–Valley Carvers (9/7-8)
Location: The Barn, Livermore, CA
Contact: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. 805-927-4718

Central Coast Carvers (9/21-22)
Location: Cambria, CA
Contact: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. 805-927-4718

Colorado

Planemaking (8/5-9), **Furniture** (8/12-30)
Location: Anderson Ranch Arts Center, Box 5598, Snowmass Village, CO 81615. 303-923-3181

Connecticut

Build A Norwegian Pram (8/12-17), Adirondack Guide Boat (8/19-24), Ultralight Canoe (8/26-30)
Location: Brookfield Craft Center, 286 Whisconier Rd., Brookfield, CT 06804. 203-775-4526

Summer Crafts Festival (8/16-18)
Location: Berlin Fairgrounds, Berlin, CT
Contact: Arts & Crafts Festivals, Box 412, Canton, CT 06019. 203-693-6335

Illinois

National Hardware Show (8/11-14)
Location: McCormick Place Complex, 23rd St. & Lakeshore Dr., Chicago, IL
Contact: Pat Dolson, 999 Summer St., Stamford, CT 06905. 203-964-0000

Indiana

International Wood Collectors Society Annual Meeting (8/4-9)
Location: Terre Haute, IN
Contact: Dave Gahimer, Box 118, Rose–Hulman, 5500 Wabash Ave., Terre Haute, IN 47803. 317-569-5704

Maryland

Maryland Crafts Festival (10/11-13)
Location: Maryland State Fairgrounds, Timonium, MD
Contact: Deann Verdier, Sugarloaf Mountain Works, 20251 Century Blvd., Germantown, MD 20874. 301-540-0900

Michigan

Woodworking Show (10/4-6)
Location: Michigan Fairgrounds, Community Arts Exhibit Hall, Detroit
Contact: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 800-826-8257

Minnesota

Woodcarving Workshop (8/11-17)
Location: Frontenac, MN
Contact: Villa Maria Workshop, Box 37051, Minneapolis, MN

Woodworking Show (9/27-29)
Location: Minnesota State Fairgrounds, Empire Commons, St. Paul
Contact: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 800-826-8257

Nebraska

Dollhouse & Miniature Show (9/20-22)
Location: Red Lion Inn, Omaha, NE
Contact: Edma Perkins, 806 Hogan Dr. Papillion, NE 68046. 402-339-5071

New Jersey

Craft Show (9/21-22)
Location: Anderson Park, Upper Montclair, NJ

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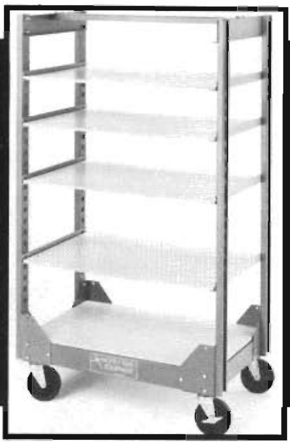

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Woodworking Show (9/13-15)
Location: Mennen Sports Arena, 53 E. Hanover Ave., Morristown, NJ
Contact: Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 800-521-7623

New York

Federation of Polish Sportsmen Craft Fair (9/7)
Location: Newman Rd., Hudson, NY
Contact: Dave Staats, RD 4, Box 24A, Hudson, NY 12534. 518-828-6140

North Carolina

Workshops: Basketry, Turning, Carving, Woodworking (August through October)
Location: John C. Campbell Folk School, Rt. 1, Brasstown, NC 28902. 800-562-2440

Workshops: Ladderback Chairmaking (8/5-10), Windsor Chairmaking (19-24)
Location: Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753-9321. 704-656-2280

Classes: Personal Directions In Wood (8/19-30), Furniture: Quick & Fun (9/2-6)
Location: Penland School, Penland, NC 28765. 704-765-2359

Blue Ridge Hearthside Craft Show (8/16-18)
Workshops: Woodcarving (9/7-8), Marquetry (21-22)
Location: Craft Center, Boone, NC
Contact: Blue Ridge Hearthside Crafts, Rt. 1, Box 738, Banner Elk, NC 28604. 704-963-5252

Woodworking Show (9/13-15)
Location: Benton Convention & Civic Center, Winston-Salem, NC
Contact: Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 800-521-7623

Ohio

Woodworking Show (9/13-15)
Location: Ohio Expo Center, Lausche Bldg., Columbus, OH
Contact: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 800-826-8257

Timber Framing Workshop (8/18-24)
Location: Oxford, OH
Contact: Riverbend Timber Framing, Box 26, Blissfield, MI 49228. 517-486-4355

Pennsylvania

Pennsylvania Crafts Festival (9/7-8)
Location: Grange Fairgrounds, Wrightstown, Bucks County, PA
Contact: United Craft Enterprises, Box 326, Masonville, NY 13804. 607-265-3230

Woodworking Show (9/20-22)
Location: Philadelphia Armory
Contact: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. 800-826-8257

Texas

Los Amigos del Mesquite Annual Convention, Competition & Trade Show (9/13-15)
Location: Hyatt Motel, Austin, TX
Contact: Herb Nordmeyer, Box 68, Knippa, TX 78870. 512-934-2616

Tennessee

Seminar: Grading, Drying & Selling Lumber (9/20-21)
Location: Norris, TN
Contact: Bill Parrish, TVA Forestry Bldg., Norris, TN 37828. 615-632-1656

Hardwood Floor Installation Class (9/23-27)
Location: Memphis
Contact: Patsy Davenport, Box 3009, Memphis, TN 38173. 901-526-5016

Vermont

Woodworking Show (9/20-22)
Location: Burlington Memorial Auditorium, 250 Main St., Burlington, VT
Contact: Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 800-521-7623

Virginia

Virginia Crafts Festival (9/13-15)
Location: Prince William County Fairgrounds, Manassas, VA
Contact: Deann Verdier, Sugarloaf Mountain Works, 20251 Century Blvd., Germantown, MD 20874. 301-540-0900

Wisconsin

Furniture Restoration Workshop (8/8-9, 8/22-23, 9/5-6, 9/19-20)
Location: Waterloo, WI
Contact: Minuteman, 115 N. Monroe St., Waterloo, WI 53594. 800-733-1776

Canada

Woodworking Show (9/13-15)
Location: Palais des Congres, 200 Dubortage, Hull, Quebec
Contact: Woodworking Assoc. of North America, Box 706, Plymouth, NH 03264. 800-521-7623

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#01566 Mrs. Plans 3.50
#04566Z Mrs. Plans & Parts 8.00
Mrs. Parts Only #04566 5.00/Ea, 13.50/3, 39.50/10

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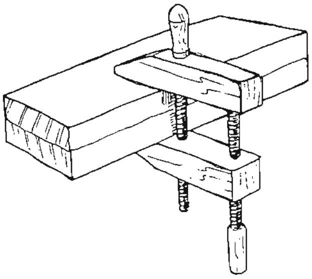

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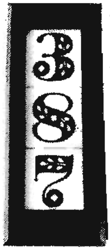

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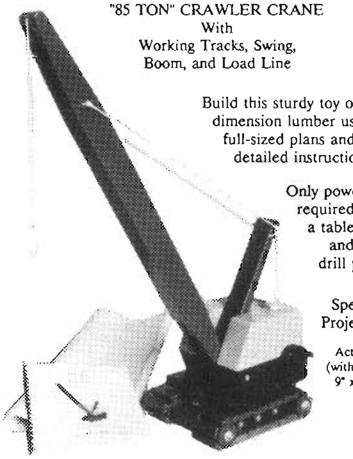

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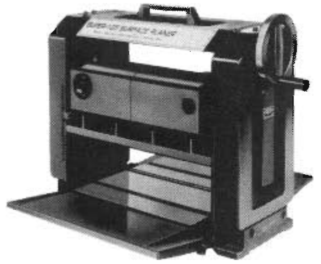

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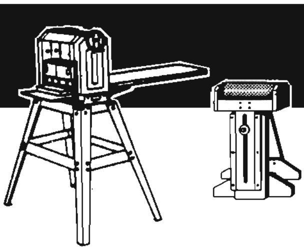

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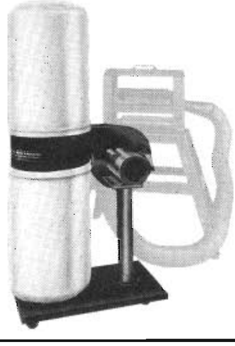

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TOOL TALK BY SANFORD WILK

Random Orbit Sanders

Probably the most significant product line improvement for woodworkers lately has been in the area of random orbital sanders. These machines produce an ultra-fine surface without digging deep into the wood. Because of the nature of the random orbital sander, you can sand either with or against the grain. This comes in handy when different members meet at different angles.

The two big new developments in random orbital sander design are interrelated. Hook–and–loop (Velcro™) backed sandpaper disks are a big improvement in their own right, but they've also made effective dust extraction possible. Hook–and–loop backed discs can be "ripped" off the pad, placed on the work bench and covered with sawdust, but still be easily reapplied. This takes "changing of grits" to a new plateau. Before, woodworkers had to contend with pressure–sensitive paper discs that not only tore too readily, but their sticky backs would get coated with dust once they were removed. This made their life span short. Although you pay considerably more for hook–and–loop type discs, the recycling potential makes them a better value than the cheaper, pressure–sensitive varieties. After all, you want to change grits back and forth without wasting sandpaper.

The only machines capable of dust extraction incorporate hook–and–loop discs. In these machines, sawdust is sucked up through holes in the paper and the sanding pads. You have to position the collection holes in the pad with the openings in the paper so pressure–sensitive disks would be harder to align and more susceptible to a user's dusty fingertips. Dust extraction also extends abrasive life, since the disk doesn't load up as quickly.

Yet another advantage to hook–and–loop disk mounting is that it opens up a vast array of accessories to make woodworking easier. This includes hook–and–loop backed sponges that speed finish applications as well as lamb's wool buffing pads that could easily make 90% of hand–buffing a thing of the past. One company (Robert Bosch) gave us another positive glimpse of the future of hook–and–loop consumables. With their test tools, they included a shipment of Microfinishing Film Discs that can be completely loaded up with dust but need not be thrown away. You simply remove the disc and wash it off, let it dry and reuse it.

There are basically two designs for this tool: vertically mounted powerhead, or horizontally mounted powerhead. Though you might assume that these two entirely different design configurations offer different options in terms of hand placement and maneuverability, in most cases we found that the motor positioning wasn't a factor. In the vertical–mount configuration, the motor is placed over the pad. Motor noise is reduced, but so is the motor's life span because of the (almost) direct transmission of power. The horizontal powerhead system incorporates a pad that runs perpendicular to the housing which contains the motor. A lot of these units resemble their manufacturer's version of an angle grinder. Since angle grinders are designed and constructed for one of the toughest and most tool–abusive trades (metalworking), the manufacturers don't take any engineering short cuts. That's why the horizontal configuration has become my favorite in the random orbital category.

But be it a vertical or horizontal motor configuration, impressive results were produced by *all* of the sanders tested for this comparative. We had to "work" with some to produce equivalent results, but at least those results could be had. The questions you have to ask yourself before purchasing one of these "shop necessities" are: how often are you going to use it, and how hard do you want to work at producing a desired finish?

AEG Power Tool Corporation

This German manufacturer is a sister company to the folks that produce one of the best engineered automobiles in the world: Mercedes–Benz. We've been impressed with many of their tools.

Though we were sent two different models of sanders, both are identical except for the size of the backing pad (disc size) and counterweight. The counterweight on the VS R600 is larger than the

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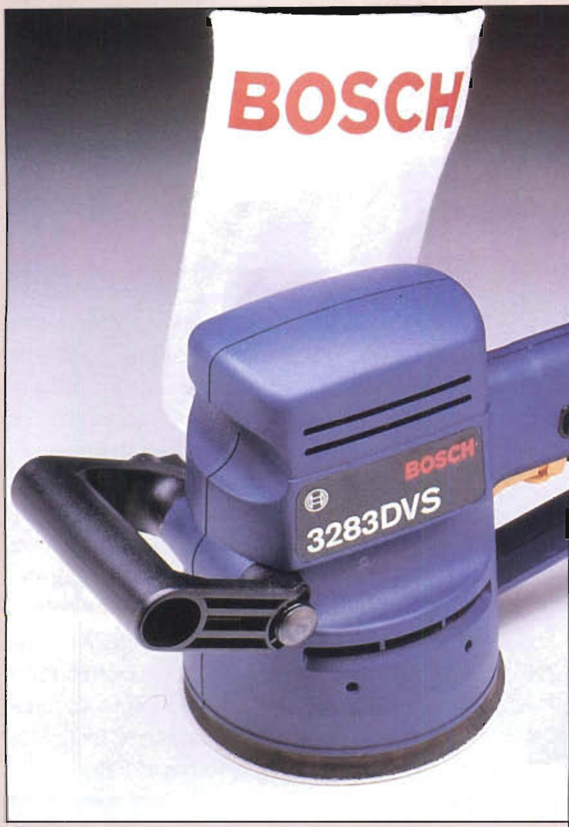
***Sanford Wilk**, a builder and organic architect in Boston, Massachusetts, heads a team of craftsmen who evaluate tools under actual working conditions.*



one found on the VSR 500 and that's due to the calibration of the pad size. In other words, don't try putting a 6" pad on a 5" tool (or vice versa) or you will end up with a unit that doesn't function properly.

Both tools are fixed–speed units. Generally, the higher the rate of oscillations, the better the finish. A fast sander can achieve good results with a coarser paper, and do so in less time. This gives AEG the advantage over the other fixed–speed units. They're even faster than some of the variable–speed models on the market. That's the good news. The down side is that the high speed generates a heck of a lot of dust. Unfortunately, there exists no means for dust extraction on either AEG sander, so that dust ends up being airborne.

Both tools make use of pressure–sensitive paper discs which we see as a handicap. On the plus side of things, AEG utilizes an arbor lock for pad change (they do wear out). No, it's not as important a feature to have as it is with an angle grinder or a circular saw, but it comes in handy nonetheless.

We wonder whether or not AEG is thinking about switching over to the hook–and–loop discs, and we hope they will consider a variable–speed control as well as dust–extraction at the same time. An upgrade is in order here, but these two competitors already have it made when you consider their beefy construction, and the fact that they both offer the highest amperage among the tools that were tested. Good start, guys; just catch up with the new developments. (AEG Power Tool Corp., Three Shaw's Cove, New London, Connecticut 06320 (800) 447-4600)

Robert Bosch Power Tool Corporation

This company is also German in origin, and you'll see from the chart on page 82 that one of their two entries (the 1370 DEVS) got the only overall rating of "10." The other sander didn't do too badly either.

The model 3283 DVS has a vertical powerhead. It utilizes hook–and–loop paper and dust extraction. We liked this unit because of these features, but we also shined to it since its front handle is adjustable to the user's discretion. Backing pads are easily changed with the turn of a single Allen wrench that stores neatly in the unit's front handle. A good speed range is another boon to this unit, but the "speed limiter" is the type you adjust by turning a little knob in the switch. It's difficult for big fingers to operate easily, but at least Bosch offers a speed option.

Bosch 1370 DEVS

The other Bosch sander that we tested met all of our expectations. Like its lower–priced brother, the model 1370 DEVS incorporates hook–and–loop fastening, dust extraction, variable speed, as well as two different levels of aggressiveness in the orbital action. It does all of this in a horizontal design, and the speed range is controlled electronically via a dial. Now that's the way we like it! The speed is constantly monitored by electronic feedback circuits, and soft–start was added by the engineers to make this random orbit sander even better. The dust extraction system is on the verge of perfection, and the cloth bag that comes standard with the tool can be replaced by a vacuum nozzle for even better pick–up. Like the other unit, pad change is handled by a single hex key that tucks neatly away in the tool's housing.

No doubt, Bosch's higher–end unit has it all, but neither one is shabby. The manufacturer also gets points for offering the widest selection of accessories for these tools. The versatility of the sanders when combined with the accessory range is startling. If you can swallow the price, our advice is to go for the 1370 DEVS without hesitation. (Robert Bosch Power Tool Corporation, 100 Bosch Blvd., New Bern, North Carolina 28562 (800) 334-4151)

Porter–Cable 7335

Metabo 0125

Metabo Corporation

Here's yet another German manufacturer, but this time we received only one test unit. It's the model 0125, and by the time you read this column, it should be available in the States. This vertically designed unit uses hook–and–loop paper fastening, and like the Bosch tools, Metabo offers dust extraction.

The tool has an electronically controlled variable speed that's maintained by a little thumb dial that is similar to the one on the Bosch 3283 DVS. This sander offers a speed range similar to the best Bosch tool, but those of you with oversized digits (common among our testers) ought to play with the control before purchasing the unit.

This sander had the smoothest running motor of all of the units we tested. The reduced vibration made the sander just that much easier to control. Metabo makes use of an Allen wrench for pad changing. The wrench isn't stored on the housing, but it can be found on the cord close to the handle. It doesn't get in the way there, and since it's elevated, it won't scratch your work either.

We liked the tool, and with a minor modification to that pesky little speed control knob, this sander could also be approaching perfection. (Metabo Corporation, 1231 Wilson Drive, West Chester, Pennsylvania 19380 (215) 436-5900)

Porter–Cable Professional Power Tools

Porter–Cable sent us three similar test units. Disc size and speed control are the only features that separate the three models. The difference between the models 7334 and 7335 is that the 7335 has variable speed, but the 7334 doesn't. The final variation on the theme (the model 7336) is a variable speed sander with a 6" disc (versus the 5" disk found on the other two units).

When I look at these well made sanders I can't help but get nostalgic. Porter–Cable was the leader in the random orbit field for woodworkers not so long ago, and like every other Porter–Cable tool, these babies are built to last. The problem comes when you make a good tool and then fail to improve upon it. All they really need is hook–and–loop system (all three tools currently require pressure–sensitive abrasives), and dust extraction. Alas, someone else was quicker and stole the thunder.

Our favorite in this line is the 6" pad, variable speed unit (model 7336). It's tough, and it's beautiful even when the sander is just sitting there on the workbench doing nothing. In the end though, you don't buy tools just to gaze at them, and the lack of hook–and–loop abrasives and dust extraction hurts the company's case. (Porter–Cable, P.O. Box 2468, Jackson, Tennessee 38302 (800) 321-9443)

Ryobi America Corporation

This sander was actually a torment to us. It has such great potential, but the folks who designed it muffled our hopes by putting a 4$^1/_2$" pad on the unit. The pad is hook–and–loop, and there is a built–in dust extraction system that's ergonomically designed into the housing, but that $^1/_2$" loss in disc size hurts the unit's stability and reduces the sanding surface to a smaller area than the competition (thus, requiring more finishing time). Perhaps the folks at Ryobi wanted to monopolize the particular sandpaper disc size that fitted their tool? No matter what the rationale, it hurts the tool's overall score in this case.

You may have a limited use (and limited budget) for a random orbit sander, and that's where this tool really begins to shine. This sander is real close to what we wanted to see in an affordable unit; it has a good feel to it and it does offer some nice features. But we sure would like to talk to the engineer that put the small pad on the tool. (Ryobi America Corporation, 1424 Pairman Dairy Road, Anderson, South Carolina 29625 (800) 323-4615)

Ryobi RS–115

Random Orbital Sanders

Manufacturer	Model	Amps	Weight	Orbits/Minute	Pad Type	Diameter	Dust Extraction	List Price	Rating 1-10
AEG	VSR 500	5.7	5.0 lbs	10,000	PSA	5"	No	$220	8
AEG	VSR 600	5.7	5.0 lbs	10,000	PSA	6"	No	$230	8
Bosch	3283 DVS	2.3	4.0 lbs	8,000-11,000	Hook/Loop	5"	Yes	$169	9
Bosch	1370 DEVS	5.0	5.3 lbs	4,800-12,000	Hook/Loop	6"	Yes	$391	10
Metabo	0125	1.8	4.4 lbs	5,000-12,000	Hook/Loop	5"	Yes	$213	9
Porter–Cable	7334	3.7	5.5 lbs	6,000	PSA	5"	No	$210	8
Porter–Cable	7335	3.7	5.5 lbs	2,500-6,000	PSA	5"	No	$230	8
Porter–Cable	7336	3.7	5.75 lbs	2,500-6,000	PSA	6"	No	$235	8.5
Ryobi	RS–115	2.0	3.2 lbs	0-11,000	Hook/Loop	41/2"	Yes	$134	7
Wen	15	2.5	3.9 lbs	3,000	PSA	6"	No	$59	6.5

Wen Products

If you don't want to spend the small amount of cash on the Ryobi, then we would like to close this comparative with one more option. It's made by Wen, a company that's famous for its finely built soldering guns, and I've seen it sell for as little as $45.00 in the stores. The unit itself is of the vertical motor mount design, and it resembles a pad sander more than it does a random orbital sander. There is no auxiliary handle and no dust extraction, just a straightforward barrel to wrap your hand around and get to work with.

The vibration on this unit is higher than the more expensive competitors but for the price, that's to be expected (hey, you've got to give up something)! Our worst criticism with the tool isn't the vibration. We could tolerate that. What we didn't like was the fact that the barrel grip forced the user's arm to become parallel with the work surface. This position just isn't comfortable for a lengthy period of time.

The Wen sander is of the pressure–sensitive paper variety, and it boasts a large 6" pad for good coverage and stability. This certainly isn't a Bosch 1370 DEVS but it's a heck of a lot better than foregoing the idea of a random orbit sander entirely. (Wen Products, Inc., 5810 Northwest Highway, Chicago, Illinois 60631 (800) 462-3630) PW

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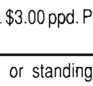

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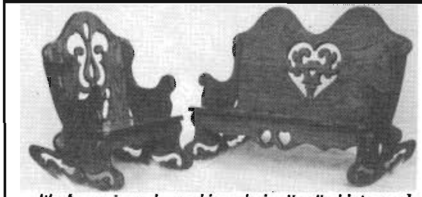

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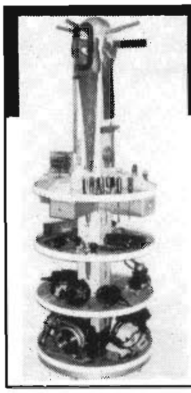

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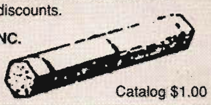

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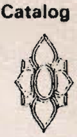

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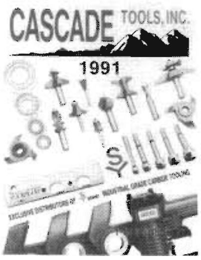

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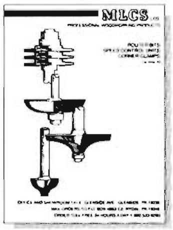

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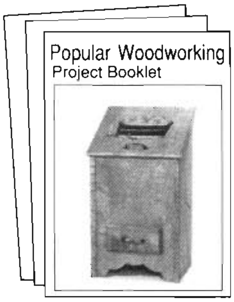

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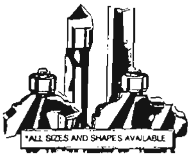
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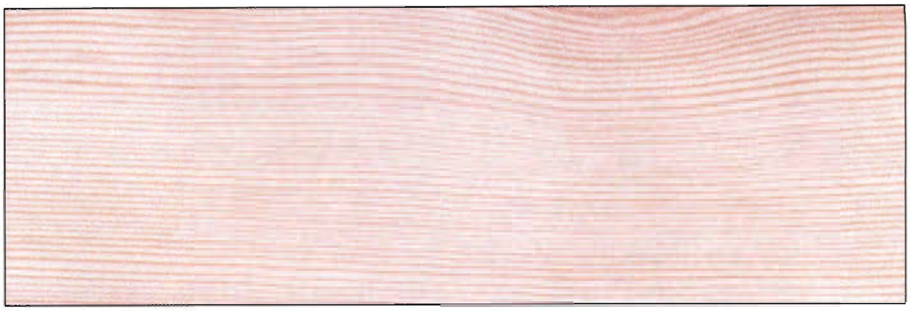
Douglas Fir



by David M. Camp

Chances are, your tools have tasted Douglas fir. Most of the world's plywood is Douglas fir, and most American homes are built from it. This rapid–growing softwood is North America's premier wood, constituting over half of the standing timber in western forests.

Doug Who?

David Douglas was a Scottish botanist who explored the Columbia River on the Oregon/Washington border, in 1824. When he arrived at the mouth of the river after his 8–month voyage, he thought he recognized hemlock trees, which he had seen before in New England. They were, in fact, western hemlock *(Tsuga heterophylla)*, but mixed in among them in an equal amount was a very similar tree that wasn't a hemlock at all. This tree became the genus *Pseudotsuga*, literally "false hemlock," with the common name of Douglas fir—another misnomer, since it's not a true fir (genus *Abies*) either.

General Description

The false hemlock tree is native to western North America, spreading from British Columbia to northern Mexico, particularly in the Sierra Nevada and Rocky Mountain ranges. *Pseudotsuga menziesii* is the predominant species, with *P. glauca* (blue Douglas fir) showing up in the Rockies, and *P. macrocarpa* (large cone Douglas fir) mostly in southern California. Other species of Douglas fir are also found in China, Japan and Taiwan.

The trees grow fast. In 90-120 years they can have a 20" diameter trunk and yield as much as 700 board feet of timber. They get to be 150-300 feet tall, and are usually free from limbs for half to two–thirds of their total height. If they live out their full life span of 600-700 years, they can produce as much as 8000 board feet of lumber per tree.

In the timber industry, Douglas fir is often referred to as "Oregon pine," a name given it by early Midwestern lumbermen who came from areas where the trees they knew as "fir" were decidedly inferior lumber trees. To them, the qualities of this softwood from The Great Northwest must have seemed akin to the good pine they were used to cutting.

The color of Douglas fir lumber can range from a pale ivory hue with yellowish figure, to a deep golden honey color, sometimes with streaks of pink or reddish–brown. The wood can also have bluish–gray stains similar to beetle–kill pine (see *Wood Types* in *PW* #32).

Plain–sawn wood displays a prominent growth ring figure, with wide sweeping arches that are almost as exaggerated as when the wood is rotary–cut for plywood. Quartersawn lumber, however, has a very plain figure of straight lines, with the contrast between the phloem and the xylem creating a sort of pin–striped effect.

Douglas fir is generally straight–grained, though curly or spiral grain sometimes occurs. It dries fairly quickly without much warping and remains stable in use. The wood is lightweight but very strong, making it a favorite for heavy construction work, roof trusses, beams, bridges and boats. Its heartwood is somewhat rot–resistant, so it's acceptable for outdoor

---

***David M. Camp** is the Editor of* Popular Woodworking.

projects. It shouldn't be used in contact with the ground, however, unless treated with a preservative; then it often sees use as telephone poles or marine pilings.

Working Properties

Though Douglas fir is ideal for framing your room addition, it has some drawbacks when it comes to use in furnituremaking or finished carpentry. First of all it's soft, so you wouldn't want to use it for parts that take a lot of wear, like drawer runners or chair rockers. It's also brittle and tends to split easily, so it's difficult to turn, even with very sharp tools. It doesn't carve too well either; the fibers tend to crush and break, instead of being cut. Nails and screws hold reasonably well in Douglas fir, and ordinary white glue or carpenter's yellow glue works just fine.

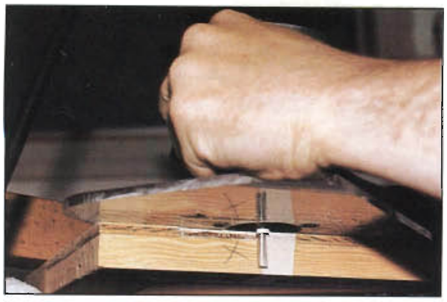
The wood gets along well with the planer and the jointer, but it can be most disagreeable with the router and shaper. The pounding of a spinning router bit can literally shatter a board. Interestingly enough, straight–grained, quartersawn wood is the most difficult to use with these machines. Walter Rockholt of Home Repairs R Us, who uses Douglas fir to make wooden windows for period homes, says that the straight, clear stuff will chip and split with unpredictable results. He prefers boards that show a definite grain direction, so he can run them through his shaper in the direction that will eliminate this tear–out.

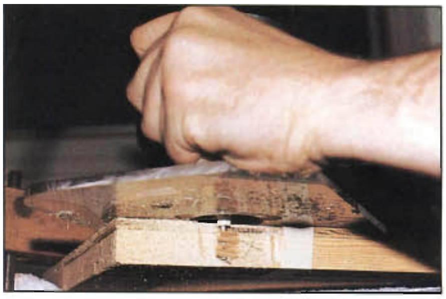
Despite its difficulties, there are some of us who find the grain and color of the *Pseudotsuga* so appealing that we want to use it in our projects anyway. I've been making my kitchen cabinets from clear fir, so I've come up with some tricks to help me keep this brittle material together as I work it. First of all, you've got to be sure that any chipping that may occur will occur on the "back" side of the piece. If you're about to crosscut a panel to finished length on the radial arm saw, make sure the "good" side is up, because as the blade comes through the back, it will definitely chip the wood. If you need to rabbet the edge of a piece, it's better to use a dado head on a table saw than a router. If you must rout, take shallow passes and rout backwards—*with* the rotation of the cutter instead of against it.

I needed to template–rout shallow mortises in my door stiles and face frames to flush–mount the leaves of the hinges I was using. I took three steps to avoid chipping at the end of the cut, as shown in the photo sequence above. I used a piece of masking tape to bind the wood together at the right end of the cut, where the bit pulls out of the wood. Furthermore, I started each cut at this end point, gently "rolling" into the recess in my template so that when I made the final pass going from right to left, any tearing would be stopped within the confines of the mortise. Since the ends of these mortises would have to be squared with a chisel, I made the recess in my template a little short of the full mortise length. That way, if any little chipping still occurred, it would be removed in chiseling to fit the hinge leaf.

Finishing

If you want to stain Douglas fir, you should use a sanding sealer first for more even absorption and less blotching. Because the wood's so soft, you're better off using a hard finish such as lacquer or varnish rather than penetrating oils. Three coats of satin polyurethane, hand–rubbed with steel wool between coats, is the finish I prefer. Paint does not work well on Douglas fir; the grain texture shows through so you won't get the sort of smooth surface you would with pine.



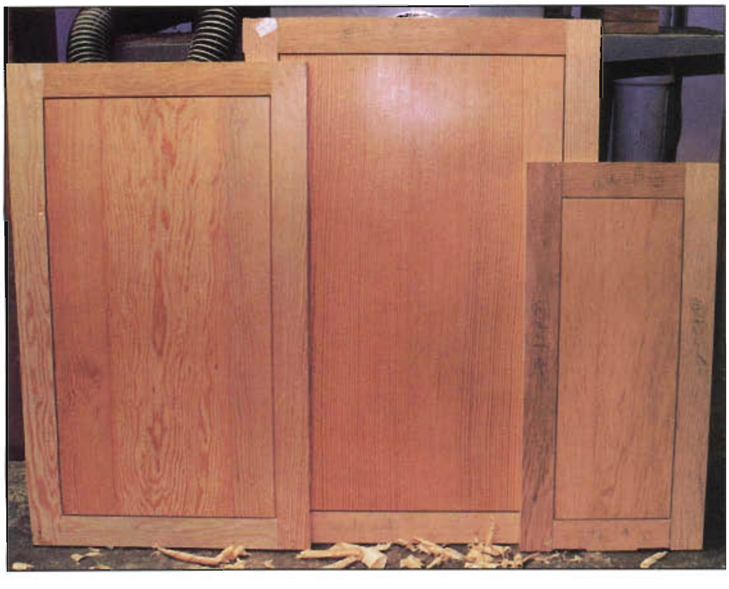


***Routing** with the rotation of the cutter often helps reduce splitting. For stopped cuts, I dip into it at the exit point, then go to the other end and rout back to it. Masking tape helps prevent splitting, too.*

Availability

Though Douglas fir grows mainly in the West, it's shipped all over the place, and carpenters on the East Coast should have no problem finding it. Since it's a softwood, it's always surfaced on four sides and comes in the standard nominal sizes, 2 X 4 through 2 X 12, 4 x 4 through 4 X 12 (and bigger of course, if you need timbers for beams, etc.) for construction purposes; 2 X 2's and one–by are also readily available. Construction grade material (as of this writing) on the West Coast is running $.65 to $.85 per linear foot for two–by standard and better, $1.90 to $2.05 a foot for four–by. One–by and two–by are available in clear select—the grade I used for my cabinets, but this stuff is priced like a hardwood. I've been paying $2.90 a foot for one–by, and they get $7.44 per board foot for two–by.

Despite its traditional role as a rough carpentry material, and the difficulties it can present to woodworkers, Douglas fir can be used for *quality* woodworking projects. It's a beautiful wood that deserves your consideration. **PW**



These cabinet doors show the variations in color and grain pattern that occur in Douglas fir.

The panels have been finished with Deft® clear satin polyurethane; the frames are unfinished at this point. The price tag still visible reads "$24.95"; that was my cost for one ten–foot 1 X 10 clear/select.

Out of the Woodwork

by Jim Kucera

The Family "Garage"

The architect who designed the two–car family garage must have envisioned suburban homeowners happily tucking their autos out of the weather. If you're lucky, he added a little extra space for storing seasonal sporting goods and Christmas tree stands. That he was no woodworker is obvious:

☛ Few garages come with built–in dust collection systems.

☛ Few have a 220V circuit.

☛ Most garages have inadequate or no heating and air conditioning.

☛ Many hold space–wasting machinery like washing machines and freezers.

I wonder how many weekend woodworkers can put one—let alone both—family vehicles in the garage?

If you answered "not me," it's time you admitted to higher–minded principles. You've chosen not to dirty the concrete with muddy tire tracks. You wish to avoid the smell of gasoline. You refuse to permit noxious CO emissions anywhere indoors!

Still, the family garage demands quite a compromise from the weekend woodworker. But for many of us, it's the only shop space available, and we'll live with the sacrifices. Unfortunately, those who live with us are not always so high–minded. Kids want a place to store bikes and archery sets; Rover prefers to sleep there than out in the snow, and the spouse is convinced that the rocker panels on the family station wagon wouldn't rust out quite so fast if it were kept "where it belongs." Try these tips for holding onto and getting the most out of what little space your garage holds:

☛ Don't refer to it as "the garage." Call it "The Workshop." Make certain, too, that family members use the term—gently remind them when they falter. The psychological advantage gained may prove helpful in maintaining your claim to the area. You may encounter less resistance to the improvements you'll want to make. After all, The Workshop is the original center of production. Like the hearth, that ancient symbol of the family home, it has its roots in all that is good in man's nature. It is there that man first made things for woman.

☛ Invest heavily in hooks and pegboards. Surface vast areas with them. Lift items up off the floor and onto the walls and ceiling. In particular, let no jig die, but find its proper place on high. You'll be surprised at just how much space you can fill. Space that teems in an organized way with specialized items proclaims to the casual onlooker—"Touch me at your peril!" Once established, others can't help but respect the right of each item to its proper place.

☛ Explain that the house was built with a dangerously underwired garage, and that extra circuits are needed to protect the family. Then contact a good electrician.

After you establish your claim and make the improvements, you're ready to equip The Workshop properly. Some weekend woodworkers mistakenly think they must settle for a "one–unit–does–it–all" machine because it takes up less space. But why have only one machine to show off to friends when you could be showing off many? Consider these principles:

☛ More is better—you *can* use a table saw to cross– and miter–cut, but can it compete with a radial arm saw teamed with a power miter box?

☛ Bigger is better—don't settle for underpowered, undersized tools. Will you be satisfied next year with a measly 2 hp table saw? Can you imagine how much more fun you'd have if you owned the 3 hp version of that router?

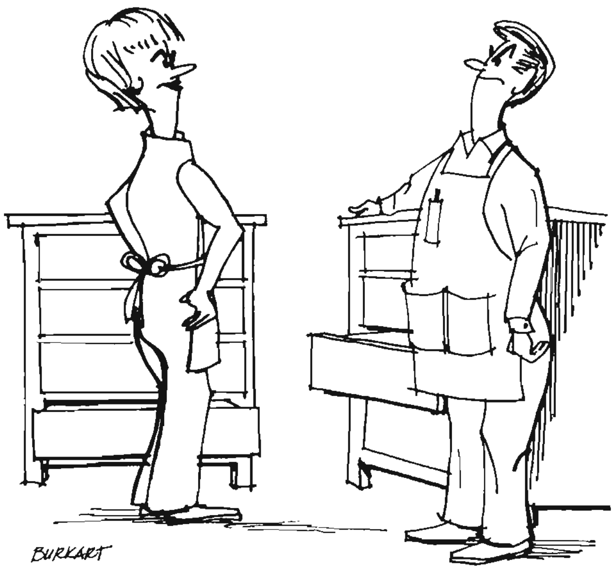
☛ Expensive is better. Now don't start having a crisis of conscience. It makes perfect sense to own expensive tools:

☛ They last longer, do a better job, look impressive, and so on.

☛ You deserve them.

With all its shortcomings, the garage is often the last refuge, the only place where the weekend woodworker can work his magic in wood, where a little sawdust can help him get away from it all. If it was ever true that "A man's home is his castle," then today, at the end of the 20th century, we can say, "The woodworker's garage ought to be his workshop."

***Jim Kucera** is a woodworker in Phoenix, Arizona.*



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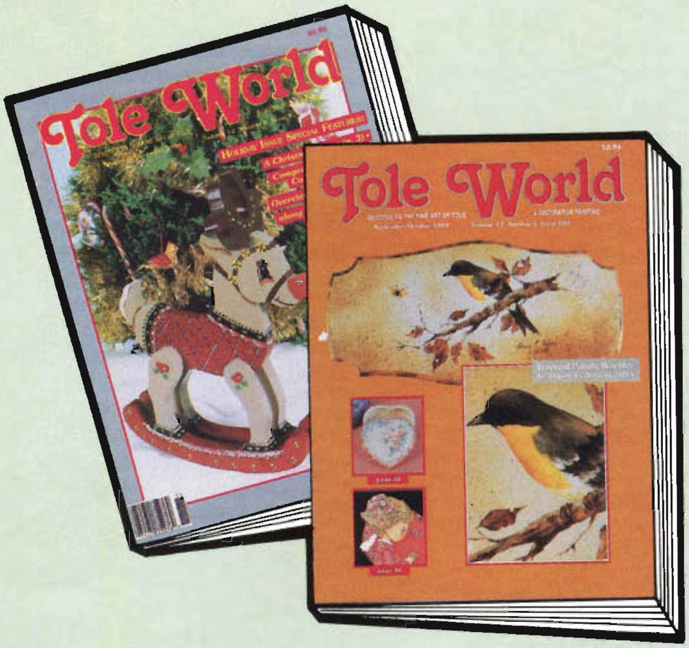

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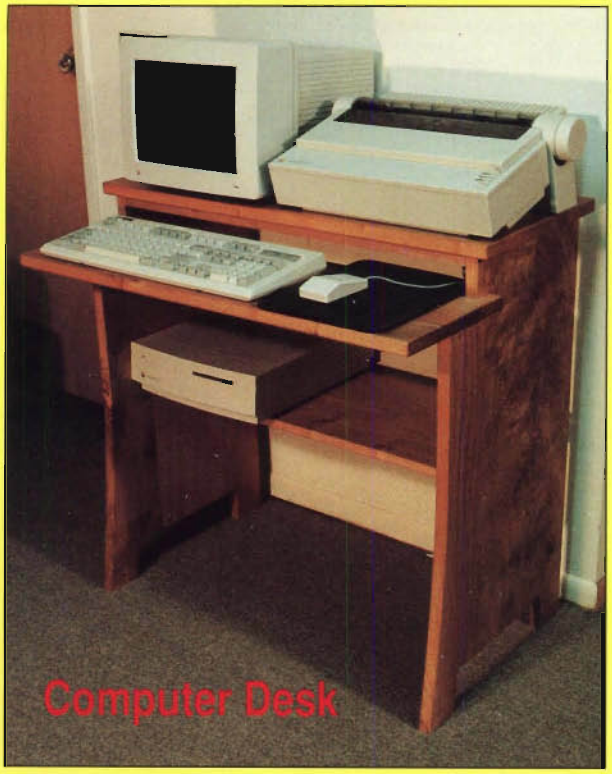
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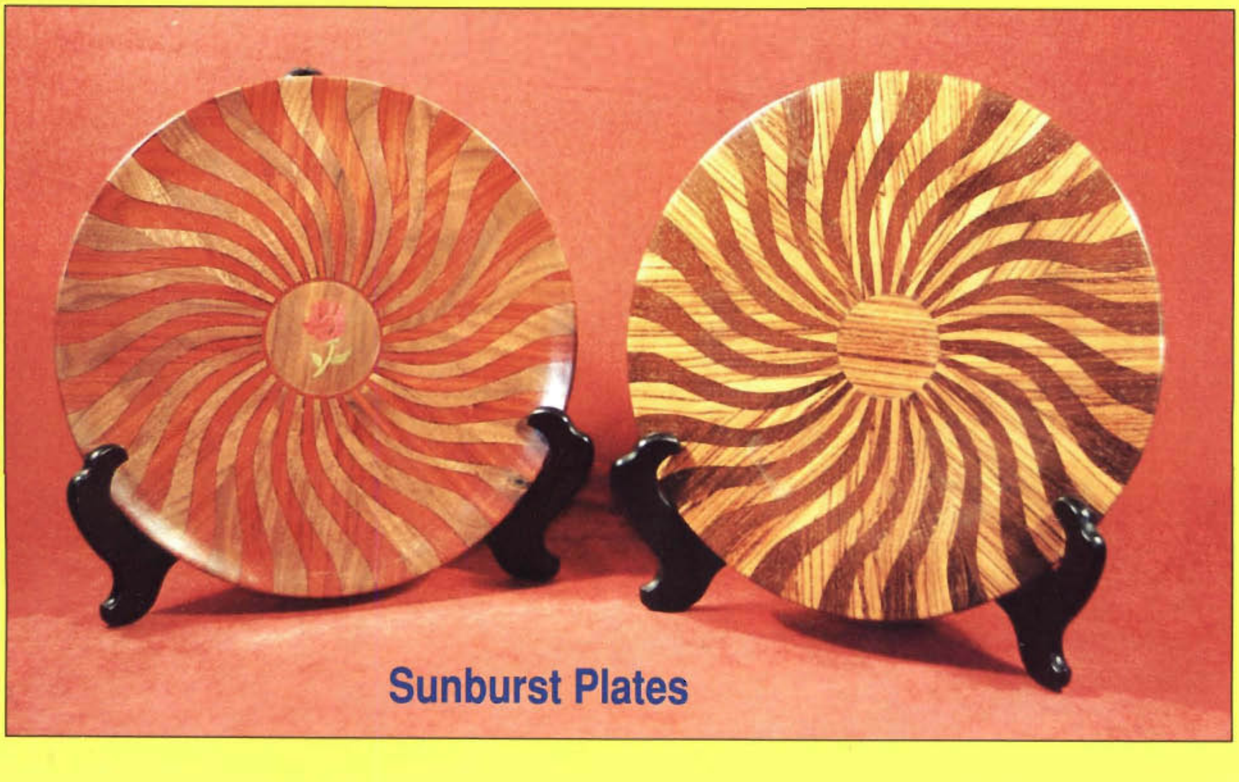
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